

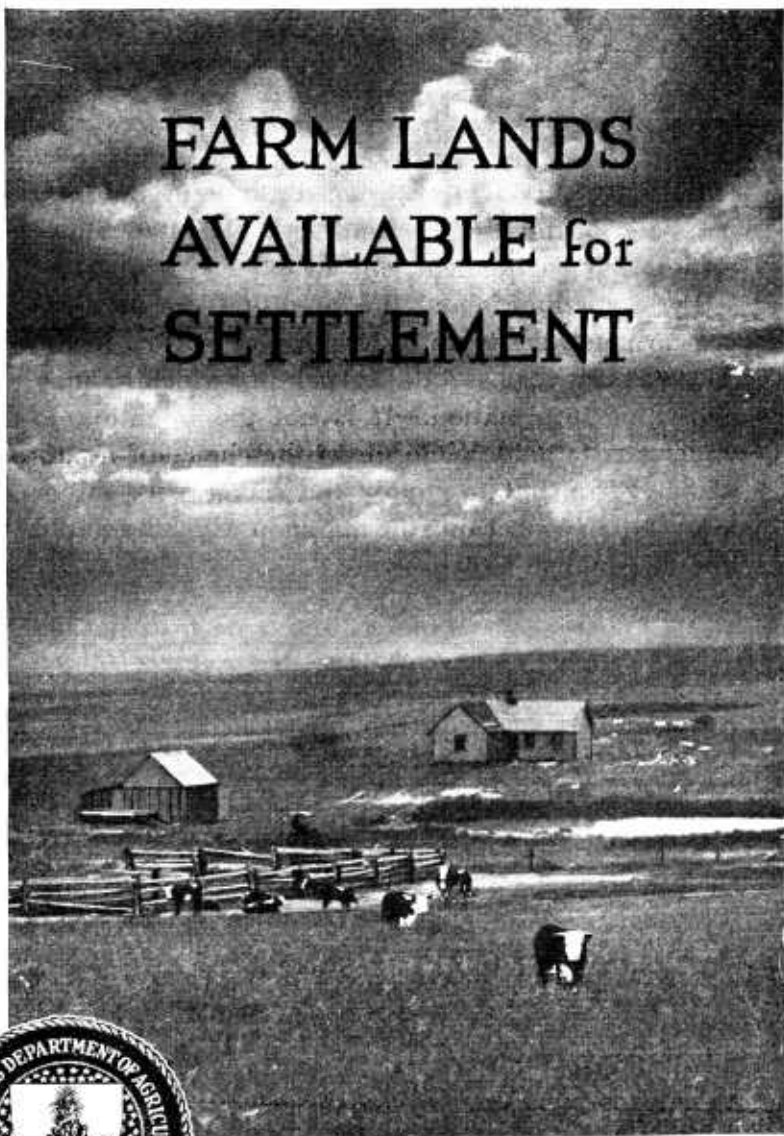
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U. S. DEPARTMENT OF
AGRICULTURE

FARMERS' BULLETIN No. 1271

FARM LANDS
AVAILABLE for
SETTLEMENT



THIS BULLETIN is designed to point out and describe briefly the land in the United States available for settlement, and to tell the prospective settler something about the conditions he may expect to meet, the types of farming prevailing in the different districts, and the agencies to which he may apply for information. It is not the intention to undertake to guide or to direct the choice of a particular farm, but to supply the settler with initial information concerning the region in which he would like to establish a farm home.

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FARM LANDS AVAILABLE FOR SETTLEMENT.

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INTRODUCTION.

APPROXIMATELY 1,000,000,000 acres, nearly half the area of the continental United States, are not in farms. Forty million acres of this large area are absolute desert, other parts are too rugged for cultivation, and some of it is covered with infertile soil. The rest of the land not occupied by farms is, in most cases, suitable for some kind of agricultural use. Of the arable land, about 270,000,000 acres are occupied by forest and cut-over land, land needing drainage, irrigable land, and other unimproved land not in woodland. About 600,000,000 acres are in the semiarid West, and fit only for grazing. However, there is no lack of acreage for the would-be farmer who wishes to acquire raw land. (See Fig. 1.)

This bulletin gives information concerning the various sections of the United States where farm lands are still open to settlement and summarizes some of the more important facts concerning them. Every community affords numerous illustrations of people who have lost time and money by attempting to settle in localities to which they could not adapt themselves. It is the purpose of this bulletin to help the prospective settler to avoid making such mistakes.

Though a large proportion of the matter that follows is given to undeveloped land, it is not intended to draw the attention of the purchaser away from land in the developed regions. The farmer who wishes to buy improved land will always find opportunities in

the market, and his problem of selection is much simpler than that of the farmer going to an untried region.

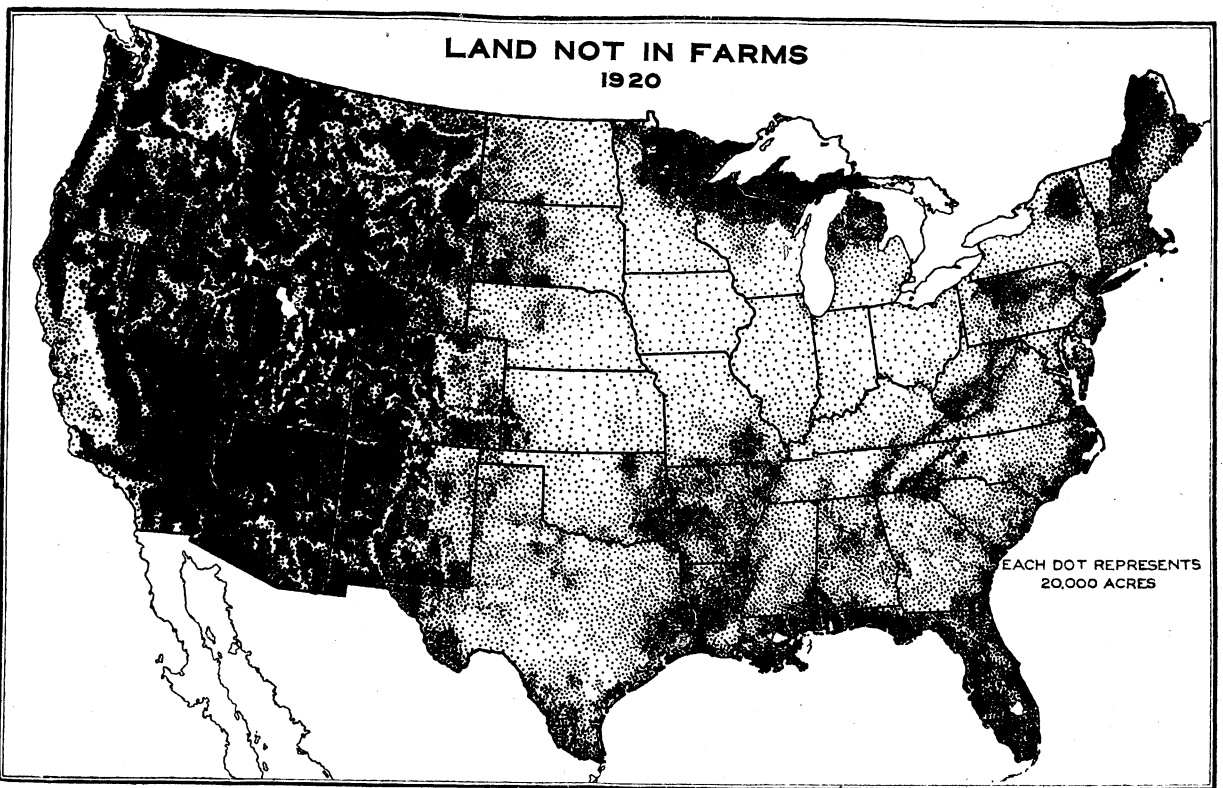


FIG. 1.—Land not in farms, 1920.

Raw land on the frontier has a lower acreage value than improved land of like quality in a developed region, and there is a certain element of adventure and freedom involved in subduing the wilderness which appeals to many persons. On the other hand, the risk fre-

quently is great in an untried region; raw land may require from three to five or more years before it will yield returns on the investment, and community and social advantages often are lacking. Land values for improved land in an established farming region are likely to be a fair index to the relative advantages of different tracts of land. Improvements are already in place, markets and marketing machinery are established, general culture and welfare institutions are accessible, the farm is a going concern, and for money invested one may expect to receive returns with the first crop year. For the man with a small amount of capital for buying farm land it is a choice between a small unit of land in a developed region, supplemented possibly by the renting of additional acreage, or a larger unit of cheap land with the hardships incident to frontier life and the prospect of a considerable period of waiting for returns on the investment.

CUT-OVER LAND.

Of the forest and so-called cut-over land (Fig. 2)¹ one large area lies in the northern part of Michigan, Wisconsin, and Minnesota, and is known as the Great Lakes district; another extends in a southwesterly direction from the western part of Virginia into eastern Texas and is known as the southern pine section; and a third lies in northern California, Oregon, and Washington, extends across Idaho into Montana, and is known as the Pacific Northwest. There are many smaller districts throughout the United States with scattered areas of fertile land which in the aggregate amount to a large area.

The general appearance of the undeveloped cut-over territory is strikingly similar in all parts of the country. The land was rapidly denuded of trees and has remained thickly studded with stumps, snags, and trees unfit for lumber, and littered with dead tops and branches. A large part of this logged-off land has been lying idle for many years and is now covered with second growth and underbrush.

Forest fires occur each year in some part of the cut-over section, and while loss of life is not frequent, valuable timber is destroyed and the soil of the unused tracts is made poorer in nitrates and vegetable matter.

Before the settler can put his land to its ultimate usefulness it must be cleared. All logs and other debris must be removed from the fields; the brush and sprouts must be cut and all must be burned or otherwise disposed of. If it is decided to remove the stumps at once, they must be piled and burned and the holes left

¹ Map 2 was published in Yearbook Separate 771, 1918, "Arable land in the United States," by O. E. Baker and H. M. Strong.

in the ground must be filled. In the Great Lakes district in the hardwood section it has been found feasible to clear the land of all but stumps, then sow grass seed and use the land for pasture. In

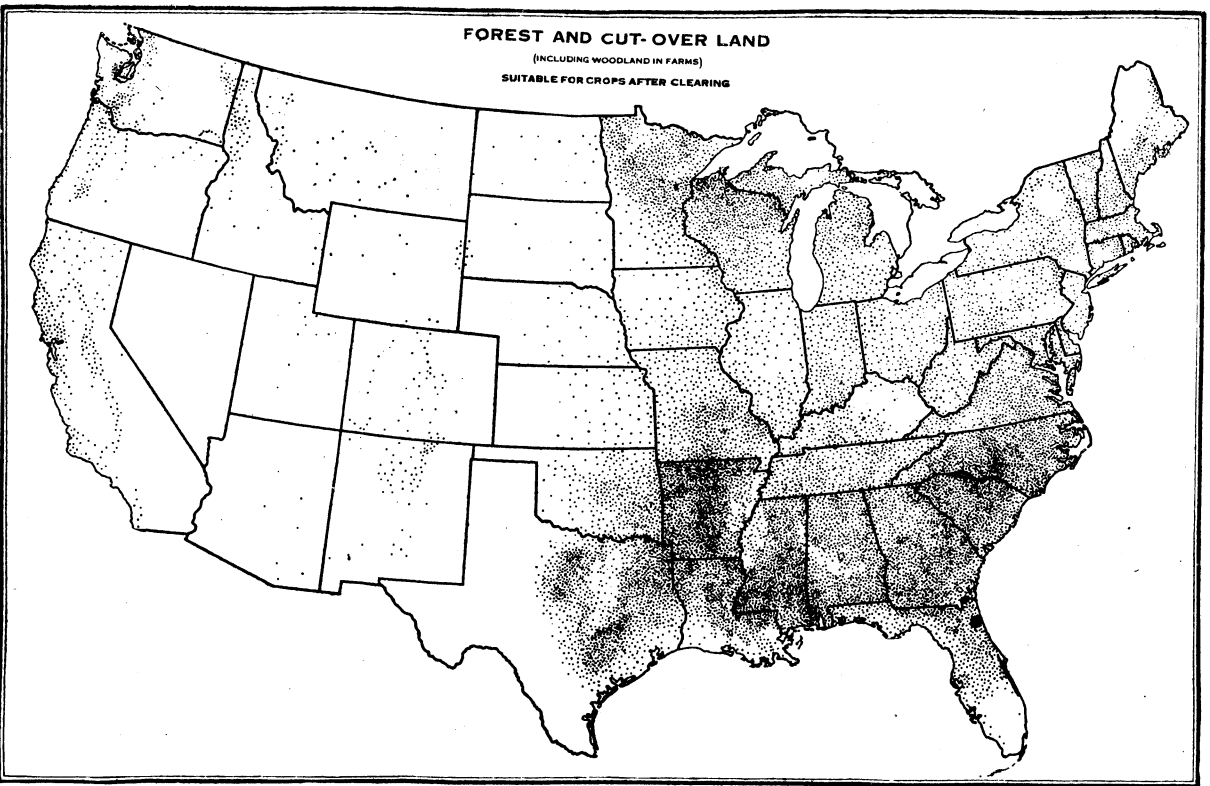


FIG. 2.—Approximate location and extent of forest, cut-over land, and woodland which could be used for the production of crops after clearing. Only such part of this land should be cleared, however, as will pay adequate returns on the cost of clearing. The estimates were compiled from Census data, Forest Service reports, and from correspondence with State and county officials and lumber companies. Each dot represents 20,000 acres.

a few years the hardwood stumps rot so that they can be removed easily with but little expense. However, in this region and in the pine regions of the South and in the Pacific Northwest the pine

stumps do not readily decay, and delay in clearing only adds to the cost. (Difficulties of clearing Douglas fir and redwood lands will be discussed later.) In the Great Lakes district and in the southern district the cost of clearing varies from \$10 to \$115 per acre, with perhaps an average of \$25 per acre. In the Pacific Northwest the expense is much greater.

GREAT LAKES DISTRICT.

There are approximately 12,000,000 acres of logged-off land in Michigan, an equal area in Minnesota, and 11,000,000 acres in Wisconsin. Some of this would be good agricultural land if cleared and properly managed. Other parts, amounting to a large area, are best suited to reforestation.

Climate.—The average rainfall varies from 20 to 35 inches. The average snowfall of the three States varies from 21 inches in dry years to above 60 inches in wet years. Summers are short and hot, with a dry August. There is plenty of rainfall for crop production, and dry years are very rare. Late frosts in the spring and early frosts in autumn limit the growing season to about four months. The winters are long, with intense cold. Sudden fluctuations of temperature of wide range are not frequent.

Surface.—As a result of glacial action, the plains have been gouged out in spots and covered with glacial drift in others until the surface is an unorganized mass of low, rounded elevations and saucer-like depressions without outlets. The surface is dotted with lakes, marshes, and peat bogs.

Soil.—The soil represents a great diversity in conditions and fertility. It varies from light sand to heavy clay, and is interspersed with boulders varying in size from cobblestones to blocks many feet in diameter. The outwash plains, or small "prairies," as they are locally called, are free from stones and afford land of the finest quality. Small areas of almost pure sand are found here and there. The bottoms of extinct lakes are sometimes covered with a layer of fine silt from a few inches to several feet in thickness, or they may be filled with peat or muck. (Peat and muck are discussed on p. 18.) Sandy loam and medium loam soils are most common. Wisconsin is the only one of the three States for which published soil surveys of the entire cut-over region are available.

The native vegetation is a fairly reliable indication of the type of soil that supports it. In its natural state this region was heavily timbered. Pines and other conifers grew in almost "pure" stands on the light sandy loams and sands, while the clay lands supported a heavy growth of hardwoods. The marshes were filled with tamarack, cedar, spruce, and balsam. Generally the settler should avoid the sandy soils, as well as the lighter sandy loams. These are more or less clearly indicated by the vegetation which they carry. In Wisconsin there probably is 2,000,000 acres of jack-pine land, and also in Minnesota and Michigan considerable areas of jack-pine and light sandy lands. The typical jack-pine plains are rather openly wooded and parklike in appearance. Scattered with the jack pine are scrub oaks, poplars, willows, junoberries, chokeberries, and other trees of shrubby growth. The small native vegetation consists for the most part of brakes, sweet ferns, huckleberries, wintergreens, and some coarse wild grasses. The characteristic soil color is usually a light yellow, brown, or gray. The sandy loam is often of a gravelly nature. There are

frequent spots of red clay, sometimes several acres in extent. In the jack-pine region a thick mat of vegetation or dense underbrush indicates a somewhat more productive quality of soil, while that which is most open, sandiest, and most thinly covered with native grasses and other vegetation is less productive.

Problems of settlement.—So far a large proportion of settlers on jack-pine lands have failed. After building a house and barn, clearing a few acres and cultivating it for two or three years, the settler is likely to give it up as a hopeless struggle. Recently, under careful management, some of the better grades of land in the jack-pine section have yielded a fair return when planted to clover and used for pasture.

The hardwood timber grew only on the better classes of soils. No definite statement can be made now as to the relative position of the original hardwood and pine growths. Patches of hardwood were scattered through the pine forests, and the regions where the hardwood predominated were not wholly without pine. Because of this irregular distribution there is urgent need for a soil survey in each of the States that has large areas of undeveloped cut-over land. As it is, the settler must exercise great care in selecting his farm. Some of the land speculators have come into possession of large tracts of cut-over lands with occasional spots of hardwood timber a few acres in extent, surrounded by wide stretches of sandy pine lands and tamarack and peat swamps. The patches of hardwood have been carefully preserved by the owners and are exhibited as typical of the former forest growth of the region. The unwary settler may find himself possessed of a farm of practically worthless land in close proximity to a few acres of good land held by the company.

Experience has shown that dairying offers one of the surest and safest methods of developing a farm in the cut-over region. If the settler can provide the roughage, it is desirable that he should have one good cow as soon as he moves his family to the place. When he is able to provide more stump pasture and more root crops for winter feed the number of cows should be increased. At the beginning it has been found that money is best invested in cows, sheep, and poultry, rather than in other types of livestock. Sheep are profitable, not only for wool and mutton, but also for clearing the land of small growth. Two or three pigs and a flock of poultry should be added as soon as feed can be raised for them and adequate shelter provided. A horse is of doubtful value during the first year or two. Some of the colonization companies keep teams which they rent to settlers at moderate rates. This is much more economical than owning a team until there is plenty of work for it to do.

In planting crops, successful settlers have provided winter feed for the stock, and, if possible, have grown something to turn into cash. Turnips, rutabagas, and mangels, with oats and pea hay,

soy beans, and clover for roughage, will carry the stock through the winter. Potatoes are usually the most important cash crop, and, when practicable, should be made a part of the crop rotation from the beginning. Winter wheat and winter rye, clover for seed, and garden and field peas are all good cash crops that may be undertaken as more land is cleared. When the settler has reached the stage when he can afford a silo, corn makes the best silage crop.

It is generally conceded by settlers, county agents, merchants, and real-estate dealers that it requires about three years for the majority of settlers to get enough land cleared and enough equipment combined with it to make a living from the land and meet the payments and interest on the indebtedness. During these three years the settler may find it necessary to add to his farm income by working for wages whenever he can spare the time from his farm. Work is usually offered by the lumber camps and mills and in near-by wood-working factories.

SOUTHERN CUT-OVER LAND.

Half a century ago the Southern cut-over region was regarded as almost worthless for agricultural purposes. Yet the population and acreage of tilled land have doubled since 1880. However, in spite of the settlement made, there is at the present time an area of forest and cut-over land equal to the combined areas of Georgia, Alabama, and Mississippi.

Approximately 75,000,000 acres of the pine forests have been cut away, but perhaps not more than 20 per cent of this area is suitable for agricultural development at the present time. While there is much land of good quality, we must also recognize the fact that there are immense tracts that are too poor ever to be used permanently for crop raising, and other areas which can be made productive only by abundant use of fertilizers and other intensive methods of farming.

Most of the cut-over land lies in the Coastal Plain which borders on the Atlantic Ocean and the Gulf; some extends into the Piedmont, which lies between the Coastal Plain and the Appalachian Mountains, and some stretches into the generally hilly and mountainous region of the Southern Appalachians and into the Ozark region of Arkansas, Oklahoma, and southern Missouri.

Topography.—The commonly accepted idea of the topography of the Coastal Plain is a broad stretch of low, very level land. As a matter of fact, "probably 15 to 20 per cent of the Coastal Plain lands of the South are rather too rough for cultivation." (Marbut, "Soils of the Coastal Plains Area".) There are two more or less continuous strips of pronounced hilly land extending roughly parallel with the eastern border of the Piedmont. One is along this border line where the abundant run-off and the numerous streams have cut the region into a series of steep-sided, fairly deep valleys, with

narrow, flat-topped elevations between them. This hilly, rough area gradually flattens out into a rolling, gently undulating, rather narrow inner plain, bordered on the outer edge by the second strip of broken land. This broken land is known in Alabama and Mississippi as the "clay hills" and through Georgia and the Carolinas as the "sand hills." The hills have been cut into and through by streams, until the region consists of sharp ridges and narrow steep valleys. From the hilly region the surface slopes gradually and very gently through a hundred or more miles down to the Gulf of Mexico or to the Atlantic Ocean and is nearly uniform in surface. The level, well-drained sections of the outer slope are broken here and there by limestone sink holes, broad saucerlike depressions known as "hog wallows," and wide river valleys. All of these low places are flooded for longer or shorter periods of each year. Most of them are unfit for farming under present conditions.

In the generally hilly and mountainous regions of Tennessee, Arkansas, Oklahoma, and southern Missouri, the slopes are well drained, but the valleys and other low sections are wet and swampy. Erosion is rapid when the forest covering is removed, and the fields are soon cut into gullies. The land is stony and of only mediocre fertility. The best agricultural land is found in the valleys, and it has been under cultivation for many years.

Soils.—Each of these topographic divisions has its characteristic soils and corresponding vegetation. By far the largest part of the area is occupied by the gentle outward slope between the hill country and the sea. This is the long leaf pine country locally known as the "piney lands," "the pine barrens," or the "longleaf pine flats." A careful analysis of soil surveys of the region shows that the soils most desirable for agriculture are loams and sandy loams. The sandy loams of good quality are located on the well-drained areas in the piney lands, in small patches in the clay-hill section, in rather large areas in the black belt, and in small scattered patches in the hilly and mountainous regions farther inland. The fine sandy loams support in the virgin forests a growth of longleaf pines with very little undergrowth. Where the forest has been removed, scrub oaks grow among the stumps or the ground is covered with a thick stand of young pine seedlings. Farther inland on higher elevations the pine forests give way to post oaks, other scattered hardwoods, and native grasses. The sandy loams are light and warm, and, in most cases, well drained, and they respond profitably to careful tillage and intelligent use of fertilizers. It is generally necessary to supply plant food to the soils since loss by leaching is rapid, owing to the sandy nature of the soil, the absence of a heavy grass covering, and the fact that the ground remains unfrozen and is subject to washing during the whole year. Some of the virgin soils contain humus enough for a few crops of cotton or corn, but it is soon exhausted unless restorative crops are cultivated. The sandy loam with a subsoil of red or yellow sandy clay within 6 or 8 inches of the surface is the most desirable, other things being equal.

Most of the sandy loams in the black belt and in the rougher sections are already under cultivation. The largest undeveloped areas suitable for settlement are in the longleaf pine cut-over section.

Considerable areas of sandy soil are scattered irregularly in all the divisions of the cut-over territory. On the uplands, drainage in the sandy soils is excessive, and crops are likely to suffer from drought. The sands have very little native humus and leach rapidly. But little residue of fertilizer is carried over in the soil from one crop to the next, and frequent applications are necessary. These soils can be tilled with very light machinery and they warm up early

in the spring. Under intensive cultivation they can be used for early truck crops.

The characteristic vegetation varies with the altitude, drainage, and distance from the gulf or sea coast. However, sandy soils are generally indicated by a scattered growth of shortleaf pine, stunted longleaf pine, old field pine, scrub oak, blackjack oak, Spanish oak, persimmons, and wire grass.

Excluding the delta lands, the territory not covered by loams, sands, or gradations between the two, is covered by clay or clay mixtures. The clays are prominent in the clay-hill section, and are present in the bottoms of "hog wallows," in valley bottoms, in lime sinks, and in other places. On the hillsides the compact clays prevent the absorption of surface water; hence the run-off is copious and rapid and the steep clay hillsides are everywhere cut into gullies. The clays are usually wet, heavy, and cold during the rainy season, and dry out and bake into hard, tenacious clods during the dry season. In the low places they prevent the downward drainage of surface water, and the land is flooded many months of the year. The clay is usually sour (acid). If cultivated when the moisture content is too high or too low it becomes unmanageable. Drainage is expensive. Cultivation requires heavy machinery, and generally the yields are poor. However, in some cases, where drainage is practical and cultivation is skillful, heavy crop yields have been obtained.

Probably the most characteristic native vegetation in the undrained areas are the gallberry and the cypress. Slash pine, black and sweet gum, water and white oak, beech, magnolia, bay, alder, and willow trees, and wire and switch grass, all indicate soils that carry a heavy water content and that must be subdued by drainage and cultivated with the utmost care.

Prospective settlers visiting the region during the dry season should take note of these conditions. Land that appears dry at that time of year may be wet during the rest of the year.

Delta soils are alluvial deposits of great depth. They are fine and uniform in the upper part of the stream valleys and have unusual fertility. In the lower regions near the coast the area is swampy and the characteristic soil is muck. Much of the delta land is wet and requires drainage before cultivation.

Opening and subduing a farm.—A new farm in the southern cut-over region, in general appearance, is very much like one in the northern cut-over region. The same financial conditions confront the Southern settler that confront the Northern settler, with exceptions due to differences in climate. The dwelling house and shelter for livestock may be constructed without so much thought being given to the exclusion of cold, the grazing season is longer, and less winter feed is required. A greater variety of crops may be produced, and in some localities two or three crops may be grown on the same field in the same year. On the other hand, the climate is less invigorating for man and work animals, while plant and animal diseases and insect pests thrive in the long, hot and humid summers and more work and care are required to combat them.

The settler's aim from the beginning should be to produce a large part of his living from his farm and to add to the cleared acreage as fast as possible. Cotton is the main cash crop, but the boll weevil has infested many areas. The dairy industry is

not so well developed as in the North. The crop farm, with livestock for home use, is probably the safest type of farming to follow. In districts where soil conditions are favorable, carpet grass, Bermuda grass, other grasses, and lespedeza afford pasturage during a long grazing season, and corn and other crops may be used for silage. Soy and velvet beans and pea hay make good fodder crops. There is usually a ready sale for corn and hay. Peanuts and hogs make a good combination, and hogs may be turned into money near the end of the first year. If conditions are favorable, money may be made from truck. As more land is cleared and brought under cultivation, the settler should early establish a crop rotation, and a combination of stock and crop farming is likely to be found desirable. Stock raising on a ranching scale appears to be practicable in parts of the cut-over district for experienced stock raisers. The stockman should select his farm in a region free from cattle ticks, accessible to markets, and it should be sufficiently large to produce plenty of grazing during the summer and plenty of feed for the winter. Cattle compelled to feed entirely on the open range during the whole year require from one to three years longer to mature than those fed grain and some roughage during the dry autumn and rangeless winter season. Some experienced farmers advocate at least 640 acres as the minimum farm unit for grazing in the rough land section.

After drainage systems have been established on the rich bottom lands and on the delta lands, heavy yields of cotton, corn, and sugar cane have been grown year after year for many years without fertilizer.

Specialty crops, such as Satsuma oranges, truck, and pecans, are frequently precarious undertakings. Sometimes they succeed, with very large returns on the investment, but frequently they do not. The prospective settler with but little capital and no experience usually finds it better business practice to confine his efforts to producing standard crops and stock animals that will contribute directly to his living, or that practically always find an established market. Large areas of sandy loams in this climate are suitable and best adapted to truck farming. The prospective truck farmer should investigate the marketing and transportation facilities and the public demand for perishable fruit and vegetables. There is a limit to the quantity of out-of-season truck and small fruit which can be profitably marketed in the United States.

PACIFIC NORTHWEST.

In the Pacific northwest the total cut-over area is approximately 6,125,000 acres, of which two-thirds is in Washington and Oregon,

and a very large percentage west of the Cascade Mountains, in the Douglas fir and redwood belts. The cut-over area is being added to at a very rapid rate as the merchantable timber is cut off. A considerable part—possibly the greater part—of the present large timber holdings consists of land unsuited for agricultural development under present conditions. On the other hand, there are extensive areas suitable for settlement.

Climate.—The Douglas-fir section of Washington and Oregon and the redwood section of California receive the full benefit of the warm westerly winds from the Pacific Ocean and are protected from the occasional cold north and east winds by the Rockies in the northern sections and by the Cascade Mountains farther south. There is slight difference between the temperature of summer and winter and between day and night. The year is divided into a short, dry summer and a long, rainy winter. During the rainy season the weather is always chilly and damp. There are a few clear days in the rainy season, but during the entire year more than half the days are cloudy. In the redwood section, during the two or three months of the dry summer season, heavy fogs come in from the Pacific practically every night and persist until the middle of the next forenoon. The writer kept a record in Humboldt County, Calif., through August and September, and in seven consecutive weeks there were only six mornings without the heavy fog. In the summer it is nearly always cool and sometimes even chilly. The annual rainfall varies from 140 inches on the exposed windward side of the hills to 25 inches on the protected leeward side. Snow rarely falls, and never stays on the ground for any length of time.

Farther inland, across the Cascade Mountains, the summers are longer, hotter, and drier; the winters are colder and the rainfall is materially less. There is a heavy fall of snow as early as December 1, and this usually lies on the ground until spring. Still farther inland, in northern Idaho and western Montana, the winter precipitation is still less and the heat and aridity of the summers increase. In this region irrigation is necessary for successful cropping in most areas.

Soil and topography.—The high, mountainous parts and steep slopes of the area are covered with glacial drift, modified in the areas where it is thinnest by weathered and decayed material from the underlying rocks. The glacial drift varies in texture from a sandy loam to a heavy clay loam or a silty loam, and contains a large quantity of large and small boulders and rock fragments. The steep and broken topography and the large quantity of stones scattered over the surface and in the soils cause this land generally to be of small agricultural value. The rolling uplands and lower foothills of the rough, mountain regions carry also a covering of glacial drift, composed mostly of sand and gravel, but containing enough fine material to give it a loamy texture. The agricultural value of this land varies considerably according to location. Where the slopes are steep and drainage is excessive, and where slack methods of cultivation are employed, crop returns are poor. On the other hand, on gentle slopes, with moderate drainage, under intensive cultivation, potatoes, fruits, and strawberries yield good returns. Only a very limited area of this soil is under cultivation. The greater portion is still in logged-off condition and some is still covered by virgin forests of Douglas fir, redwood, California pine, and other woods.

Alluvial deposits are found along the river bottoms, on the broad flat deltas at the mouths of the streams, in the tidal flats, and in the fan-shaped

deposits spread out at the foot of steep mountain slopes where the streams debouch upon the plains or into the flat valley bottoms. In the steeper, narrower parts of the river valleys, and in the upper parts of the fans, these deposits consist of coarse sands, gravel, and cobblestones. During the dry season the drainage is excessive; during the rainy season they are subject to overflow, and because of their gravelly nature cultivation is always difficult. However, along the lower courses of the streams or where the gradient is gentle, on the deltas, and on the outer edges of the fans, the soils are of a fine even texture, are unusually fertile, are comparatively easy to clear, are easily irrigated when water is available, and are among the desirable soils of the region. In many cases artificial drainage is necessary.

Throughout the region there are inclosed basins of more or less extensive areas that at one time held small lakes or ponds. These have been gradually filled in by surface wash and vegetation, or have been drained by the lowering of outlets, and are now covered by a deep deposit of peat, muck, or marly earth. Some of these were bogs with a more or less general circulation of water, others were peat bogs of stagnant water. The former, when old and solid, or when drained, offer one of the best soils in the entire region—the black muck. The peat bogs contain too much acid for most plants and are unfavorable for nearly all crops.

The beach soils, and the old deposits from glacial waters, are made up of sand and gravels washed clean of all fine and soluble materials. The first are of very limited extent along the beach and are nonagricultural. The second are in valleys along the higher streams and in rounded mounds among the foothills. Like most sands and gravels, these soils are not desirable.

In the region of heavy rainfall, steep slopes, and slippery clay soil, landslides are of common occurrence. The accumulation of loose material brought down in the slides and deposited at the foot of the mountain or hill slopes or in the valleys, does not lend itself readily to cultivation. The surface is usually made up of narrow steps, the underlying material brought to the surface needs to be weathered before it becomes productive, and the stones and boulders gathered in the downward slip interfere with cultivation. It is well for the prospective purchaser to assure himself that his farm does not contain a large proportion of land-slide debris.

Another condition that should be considered is the tendency of the clay and loamy hillsides to gully as soon as the forest is removed. Along the coast regions during the long rainy season, when the ground is not frozen and there is no close grass covering, even the gentler slopes are soon cut into gullies.

In the north, back of the Cascade Mountains, lies the region of lava flows and "blow soils." The buttes and mountain regions are covered with soil weathered from the lava of the Columbia River lava flow. It is thin and stony, is excessively drained, and is only fairly desirable for agriculture. When cleared it erodes easily. This is naturally forest land and should be kept in timber.

The gently rolling hilly and prairie regions are covered, as with a blanket, by a layer of windblown material. This is fine, weathered soil from the great stretches of lava flow, and is uniform in texture. It belongs almost entirely to the Palouse series and is the most productive and, when favorably located, the most desirable land in the region, though great care must be used in handling it. The largest percentage of this land is under cultivation.

Vegetation.—The Pacific Northwest is characterized by excess of moisture near the coast and scarcity of moisture in the interior. The soils of these areas are hardly distinguishable by the plant covering, since the distribution

of the plants depends more upon the soil water than on soil composition and texture. Table 1, taken from the Soil Survey of the Eastern Puget Sound Basin, Washington,² shows the general type of vegetation that may be found on soils with varying amounts of water content.

TABLE 1.

Trees and small plants.	Soil.	Subsoil.	Trees and small plants.	Soil.	Subsoil.
Cedar.....	Soggy.....	Soggy.....	Madrona.....	Very dry....	Dry.....
Vine maple.....	do.....	Do.....	Oak.....	do.....	Do.....
Hemlock.....	Wet.....	Wet or soggy.....	Yellow pine.....	do.....	Do.....
			Wild currant.....	Damp.....	Well drained.
Alder.....	do.....	Do.....	Sagebrush.....	Free from alkali.	
Saloe.....	Damp.....	Wet.....			
Red fir.....	do.....	Do.....	Tule grass.....	Swamp soil free from alkali.	
Dull Oregon grape.....	do.....	Do.....		Alkali.....	-
Cottonwood.....	Rather dry..	Damp.....	Greasewood.....	Some alkali.	
Shiny Oregon grape.....	do.....	Do.....	Greasewood and rabbit bush.		
Shore pine.....	Dry.....	Do.....			
Mountain balm.....	do.....	Do.....			
Evergreen huckleberry.....	do.....	Do.....			
Manzanita.....	do.....	Dry.....			

A clean stand of pine timber generally indicates a porous, well-drained soil, underlain by sand or gravel for 5 to 6 feet. The wild currant grows only on well-drained sandy loam free from overflow and when near a lake shore or along a river is likely to be an indication of good land. Where the Palouse series is timbered it supports an open forest of yellow, white, and lodgepole pine, with some fir, spruce, tamarack, and cedar. The peat bogs support the characteristic peat plants.

Opening and subduing a farm.—The cost of clearing in the Pacific Northwest is very high. In the redwood and Douglas-fir sections the stumps are very large and deep rooted. Large quantities of explosives are necessary for each stump. Much labor is required to pile and burn the stumps after they are out of the ground and to fill the immense holes left by blasting before the fields are ready for cultivation. In the pine region the stumps are not only large, but have very deep tap roots. None of the stumps rot out as the hardwood stumps do, and if the land is allowed to lie unused it usually produces a dense growth of underbrush and young trees. In this way the cost of clearing is increased from year to year. Angora goats have been employed, with varying degrees of success, to kill out the underbrush and young growth. In most instances the cost of the raw-stump land, plus the cost of clearing, exceeds the value of the land after it is under cultivation. For this reason the bulk of the logged-off land has been permitted to lie unimproved and unused since the timber was removed.

"A man without capital can not hope to clear in a short time a tract of land large enough to support a family. Under the most favorable conditions the cheapest rate at which logged-off land can be prepared for the plow is \$50 an

² Field Operations of the Bureau of Soils, 1909.

acre. The maximum should not ordinarily exceed \$150 per acre, although there are exceptional tracts that will cost over \$200 to clear."³

Conditions in the Northwest cut-over country are so varied that it is difficult to generalize about the types of farming suitable for a new farm. Along the coast, the foothills, river valleys, and other cultivable tracts are suitable for dairying. Alfalfa, grain cut green for hay, potatoes, and berries are grown, and apples, cherries, peaches, plums, and pears produce fairly well. Around Seattle, Tacoma, and Portland, and within reach of San Francisco and other large cities, market gardening, poultry raising, dairying, and small-fruit culture are well established. Not many instances of general farming or general stock raising are found near the coast. There is not enough sunshine to make grain farming profitable, except in the sheltered valleys on the leeward side of the hills.

Wheat has been a leading crop in the Sacramento Valley and tributary valleys for many years, but the soils must be properly worked and restored in order to keep up the fertility. Stock raising and alfalfa also make a good combination on the valley lands. If the settler can hold on long enough he can grow orchards of apricots, peaches, and walnuts for side crops to sell for cash. Potatoes are also a cash crop. Much of the fertile land remaining to be cleared is in remote valleys and in places where railroad transportation is poor.

Behind the mountains, in the eastern parts of Washington and Oregon, and in Idaho and Montana, the loess, or "blow soil," is unusually well fitted for wheat production. Where the subsoil is favorable, good yields are made by dry farming if precautions are taken to prevent "blowing." Irrigation, forage growing, and stock raising make a fairly sure combination. These combination methods require large unit areas in order to make the business pay. In the higher altitudes cattle are summered on the range and taken to the valleys to be wintered on forage crops either produced at home or shipped in. On the lower river bottoms, where water is accessible, general farming has been established.

Comparatively large areas of cut-over land have been cleared and planted to orchards of hardy fruits. Large areas undoubtedly well adapted for orchards still remain to be cleared. However, much that appears to be suited to orchards is underlain by a thick hardpan. Before such land can be used the hardpan must be broken up by the expensive process of blasting and even then it does not give first-class results.

³ Bureau of Plant Industry Bulletin 239, "Cost and Methods of Clearing Land in Western Washington."

Many of the fertile river valleys and old lake beds produce crop yields beyond the average in other regions, but are isolated by rugged mountains, and the only outlet for surplus produce is by means of auto stages and trucks or, when located near the coast, by ocean steamships that make irregular and infrequent calls. However, many of the fertile valleys are tapped by railways.

In general it may be said that opportunities are to be found in this region, but the newcomer should thoroughly understand the conditions that he must face and the amount of capital he will need.

DRAINABLE LANDS.

The total area of land in the United States that is too wet for cultivation is approximately 113,537,000 acres. It has been estimated that about 91,543,000 acres of this will be suitable for agriculture after reclamation. Most of the undrained land lies east of the one-hundredth meridian (Fig. 3), in the midst of the oldest and best developed sections of the country, as will be seen by reference to table of distribution (Table 2).

TABLE 2.—Wet, swamp, and overflowed lands in need of drainage, 1920.

State.	Acres.	State.	Acres.
Alabama.....	2,664,000	Nevada.....	53,000
Arizona.....	23,000	New Hampshire.....	119,000
Arkansas.....	4,220,000	New Jersey.....	502,000
California.....	1,179,000	New Mexico.....	26,000
Colorado.....	66,000	New York.....	815,000
Connecticut.....	111,000	North Carolina.....	5,390,000
Delaware.....	188,000	North Dakota.....	137,000
Florida.....	16,846,000	Ohio.....	269,000
Georgia.....	6,876,000	Oklahoma.....	650,000
Idaho.....	97,000	Oregon.....	650,000
Illinois.....	600,000	Pennsylvania.....	300,000
Indiana.....	778,000	Rhode Island.....	33,000
Iowa.....	368,000	South Carolina.....	4,589,000
Kansas.....	280,000	South Dakota.....	209,000
Kentucky.....	555,000	Tennessee.....	669,000
Louisiana.....	10,431,000	Texas.....	6,824,000
Maine.....	1,287,000	Utah.....	145,000
Maryland.....	499,000	Vermont.....	73,000
Massachusetts.....	135,000	Virginia.....	1,038,000
Michigan.....	5,111,000	Washington.....	689,000
Minnesota.....	5,909,000	West Virginia.....	74,000
Mississippi.....	4,752,000	Wisconsin.....	4,046,000
Missouri.....	1,085,000	Wyoming.....	13,000
Montana.....	79,000		
Nebraska.....	91,000	Total.....	113,537,000

The entire area may be roughly classified as tidal flats, located along the sea and gulf coasts; river flood-plains, located principally in the valley bottoms of the rivers flowing across the Atlantic Coastal Plain, along the Mississippi and its tributaries, and along other rivers; the Everglades in Florida; and the glacial marshes, muck and peat bogs of the north-central part of the country. It has been demonstrated in each of these provinces that much of the land,

with the exception of peat bogs, is unusually fertile and durable and that drainage greatly increases its value. This indicates that

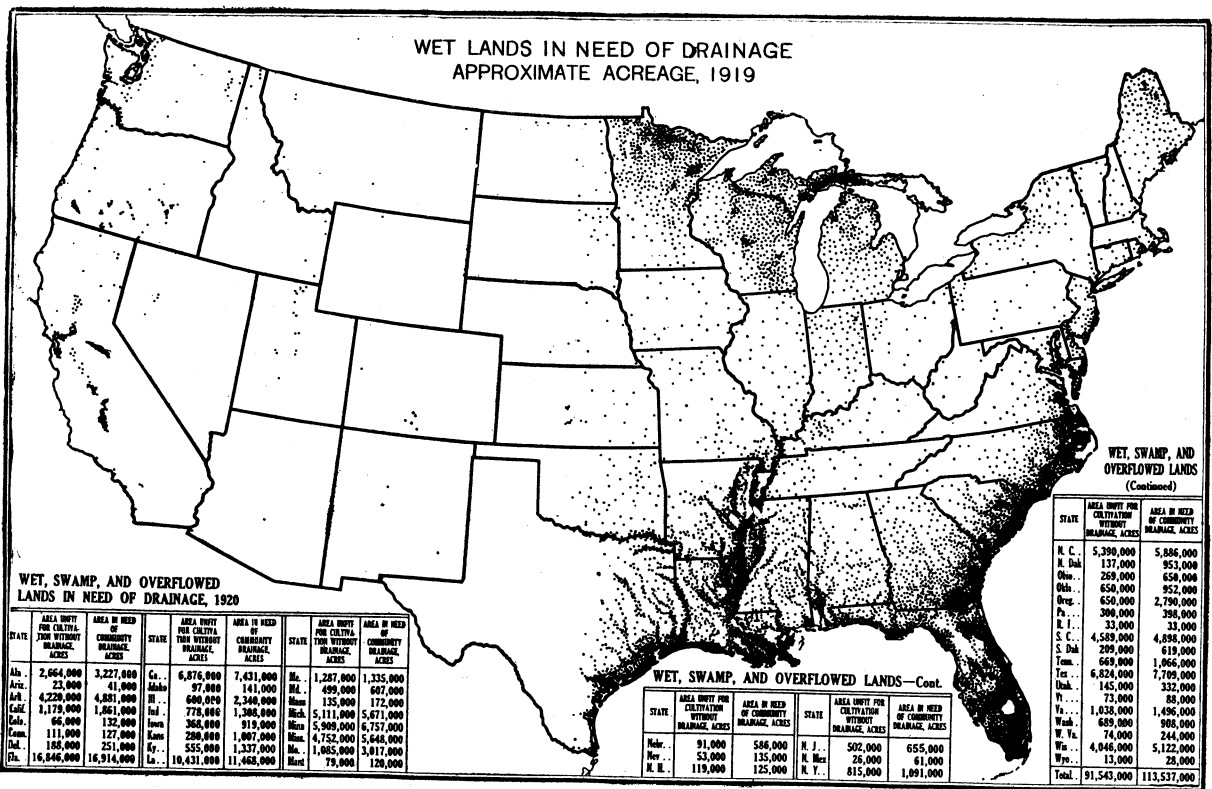


FIG. 3.—Wet lands in need of drainage. Approximate acreage, 1919. Each dot represents 10,000 acres. The actual area covered by the dot is approximately equal to the area it represents. Prepared for the Graphic Summary of American Agriculture in the 1921 Yearbook of the Department of Agriculture.

eventually the greater part of the area will be subdued and made productive. However, considerable areas, after careful investigation, may prove to be of less value for agriculture after drainage

than in the present undrained condition for fish, wild fowl, fur-bearing animals, recreational purposes, or for water conservation. This land is not all located in a few continuous bodies of considerable extent, but is for the most part made up of more or less irregular and isolated swamps and bogs. The Everglades of Florida is an exception. At the present time the prospective settler who contemplates purchasing undrained lands should acquaint himself with the difficulties and economic problems of the undertaking and weigh them well.

Individual owners of small plots of wet land frequently find it impossible to establish successful drainage systems independently. In order to be successful drainage systems must be installed at a cost less than the resultant increase in value of the land accruing from the drainage, and must adequately remove the surplus water from above and under the surface. Such a system can be secured in an economical manner only by cooperation and by a just allotment of costs assigned in a ratio measured by the benefits received by each plot of land, and not by the amount of work done on each unit. Laws have been enacted providing for drainage districts to meet this difficulty.⁴

The man who reclaims land by drainage must take into consideration the watershed that discharges upon his land and the amount of run-off therefrom, and provide for the conduct of the surplus water, and also he must consider a right of way for the outlet of his drains and for disposal of their load of water. After the system is once established it is by no means self-sustaining. It requires constant care and expense to keep the levees intact, the outlets clear, and the ditches and laterals free from silt and vegetation.

In the eastern part of the country, with the exception of the Florida Everglades, the wet prairie lands of southern Louisiana, and lands along the Gulf Coast in Texas, nearly all of the large tracts of unsettled, unreclaimed lands needing drainage are timbered. Where the timber is heavy, the clearing is expensive and usually costs more than the drainage. These two expenditures generally aggregate more than the value of the land after it is reclaimed, and this fact has retarded the development of wet timbered lands.

Soils.—As a rule the soils of swamps and overflowed land require little fertilizer, if any, for many years after being put under cultivation. However, there are many acres of undrained soils that are undesirable for farm land even after drainage, or that must be cultivated by special and carefully worked-out methods.

⁴ Apply to Chief of Drainage Investigations, Bureau of Public Roads, Washington, D. C., for information about drainage districts.

In the glaciated region of the United States, and in the Everglades, there are vast areas of peat. Minnesota has about 7,000,000 acres, Wisconsin has between 2,500,000 and 3,000,000 acres. Michigan has a large acreage; Illinois, Indiana, and Ohio together several hundred thousand acres, and Florida has about 2,000,000 acres of peat and muck. Probably the Everglades peat is the largest undivided area of this soil. In the North the peat lies in scattered patches, varying in size from an acre or two to several hundred acres. The beds are all as level as a floor, and in the North by far the largest part of the area is occupied by stunted tamarack and spruce, small shrubs, and sphagnum. The value of the merchantable timber is small. After partial decomposition the peat resembles in color the dark rich soil of the productive prairies. This appearance, the level surface, and the small expense of clearing combine to make peat bog land a tempting field for speculators, as such land is easily sold to unwary buyers. The prospective settler should learn to distinguish readily and surely between muck land and peat bogs. The ability to do so may be acquired easily by learning the characteristic plants. As bog plants do not vary much in any part of the United States, the task of learning them is not difficult. The peat bog usually has no surface outlet, and the typical plants of the northern bogs are Labrador tea (an evergreen shrub), swamp laurel, hardhack, cranberry, peat moss, sundew, pitcher plant, and dwarf birch.

Peat beds are usually high in acids and nitrogen content, but totally lacking in phosphorus and potash, and in most cases in lime. Added to the expense of drainage and clearing is the expense of the initial chemical requirements before the peat soil will produce, if at all. Up to the present time the beds under cultivation have not been satisfactory, except in a few cases where specialty crops of cranberries, onions, celery, and a few other truck crops have been grown by intensive cultivation. A very small percentage of all the peaty soil yet to be reclaimed would produce enough cranberries, celery, and other vegetables that can be made to grow upon it, to glut the market for these crops. Under present conditions the most profitable utilization of this type of land seems to be for pasture and for hay.

The fresh-water bog usually has natural drainage, is not sour, and has a high nitrogen content. In addition there is usually present a mixture of considerable marly material, contributed by fresh-water shell-bearing animals and lime-collecting plants. Among the fresh-water plants are cattails, tule rush, common water lily, pond weeds, sedges, arrow grass, and burr reed. When well located and adequately drained the soil of the fresh-water bog, or black muck, is uniform in texture, fertile, and durable.

TIDAL MARSHES.

There is an extensive area of tidal marshes stretching along the coast from Long Island to Point Isabel, Tex. The reclaimable tidal marshes are usually found behind barrier beaches along the outer coasts and in other localities protected from violent wave action. The area is extensive, running up into the millions of acres, and the natural fertility is unquestioned. In its natural state it can be purchased for 75 cents to \$2.50 per acre. The average cost for drainage is usually between \$50 and \$60. The tidal marshes receive not only the drainage from the hinterlands, but are also subject to overflow from

storm and spring tides. This adds to the difficulty and expense of establishing and maintaining a drainage system. Dikes or levees, ditches, sometimes pumps, and free outfall channels are necessary. The prospective settler should be informed as to the following points before he undertakes to reclaim tidal marsh land:

Elevation of land above low tide.—Land above 3 feet elevation yields fair to good crops. Below 3 feet shows mostly crop failure, but in some cases makes good pasture. Below 1 foot only worthless reeds and cattails grow.

Level at which it is possible to maintain the ground-water table.—Land less than 1 foot above the ground-water table is practically worthless; between 1 and 1½ feet above ground-water is good for June grass, other grasses, white clover, and fescue and makes fine pasture; between 1½ and 2 feet above ground-water is good for timothy and corn; and above 3½ feet is safe for wheat, oats, rice, vegetables, strawberries, etc.

Fertility and depth of the soil.—Tidal-marsh soils are generally acid and require lime as a corrective.

Protection from storm tides.—Unless protected by barrier beaches, spits, necks, headlands, or other shore features, the levees, outlets, and other works may be destroyed by high storm waves and tides.

Amount and rate of soil shrinkage.—Careful measurements, covering long periods of years, have shown that marsh soils shrink and subside after drainage from 1 to 7 feet. This shrinkage lowers the ditches and outlets and necessitates the installation of pumps. It also lessens the depth of the ground-water table below the surface.

Markets for products of the land.—If the prospective settler proposes to engage in mixed stock and general cropping his problem will be principally to keep enough land under crop to supply grain and forage for winter feeding and sufficient grazing land to carry through the summer. If he plans to engage in specialty farming the problem has three phases: (1) The suitability of the soil and water content for the crops under consideration; (2) transportation and marketing facilities; and (3) demand for the crop at the season when it is harvested. As in all other regions, specialty crops are precarious undertakings for the man with no experience.

Length of time necessary to get satisfactory results from newly reclaimed land.—It usually requires about three years to aerate the soil, wash out or counteract the acid, and reduce it to the tilth that will make the farm a going concern.

RIVER FLOOD PLAINS.

The undrained and overflowed lands in river flood plains approximate 32,000,000 acres in area. Not all of this land is suitable for agriculture, and some of it is so heavily timbered that the cost of clearing and draining more than equals the value of the land. However, probably more drainage and clearing work have been done on river-bottom land than on any other type of undrained land. The soil is alluvial, gathered, in most cases, from a widespread drainage basin, and is finely pulverized and spread in even layers on the level floor of the valley. The natural slope of the valley usually facilitates

drainage. In areas that have been reclaimed, exhausting crops such as cotton, corn, and sugar cane have been grown without fertilizer year after year for many years with unusually large yields. If the prospective settler is able to acquire a farm at reasonable cost in a valley protected from overflows by reliable levees and drained of surplus water by a system of ditches and tiles, his chances of success are good.

As a physical proposition it is possible to reclaim all swamp and overflowed land that has arable soil. But as the work is expensive both for the first construction and for the subsequent maintenance and operation, the really difficult and fundamental question is, whether the value of the land after its reclamation will be sufficient to justify the expenditures necessary to carry out the work.⁵

Under existing conditions reclamation of these lands is a long and laborious process that can be accomplished only very slowly unless the settler has ample funds to finance his improvements. The man with only his hands and a small working capital meets with many difficulties, some of which he frequently finds insurmountable, and the result is that many settlers do not make good. If the settler on such land must continue to finance the development from his own capital as in the past, without the aid of cooperative organization, the prospects are not very attractive to anyone except the person with ample capital.⁶

For the regions where clearing as well as draining is necessary, an act providing for clearing districts comparable to drainage districts has been suggested to hasten the work and to assist the pioneer settler.

IRRIGABLE LANDS.

Generally speaking, the land lying west of about the one-hundredth meridian, which passes through the west-central portions of the Dakotas, Nebraska, Kansas, Oklahoma, and Texas, receives a rainfall too light for ordinary production of crops. As stated earlier, much of this land is nonagricultural. Nevertheless, there are many broad and fertile river valleys, level plateaus among the mountains, lake beds or lake margins, and other places that can be irrigated (Fig. 4). The present area under irrigation, according to census statistics for 1920 is given in Table 3.

⁵ U. S. Dept. Agri. Exp. Sta. Bul. 238, p. 74.

⁶ Yearbook Separate 781, "The Drainage Movement in the United States, 1918."

TABLE 3.—Distribution of land under irrigation.

States.	Area enterprises were capable of irrigating, 1920.	Area included in enterprises in 1920.	Additional area to which existing works will be capable of supplying water when completed.
	<i>Acres.</i>	<i>Acres.</i>	<i>Acres.</i>
Arizona.....	627,303	813,153	185,850
Arkansas.....	179,013	246,480	67,367
California.....	5,894,466	7,805,207	1,910,741
Colorado.....	3,855,348	5,220,588	1,365,240
Idaho.....	3,062,810	3,780,048	687,238
Kansas.....	67,853	102,562	34,709
Louisiana.....	728,742	851,211	122,469
Montana.....	2,753,498	4,329,148	1,575,650
Nebraska.....	562,468	766,768	204,300
Nevada.....	704,708	1,382,036	677,328
New Mexico.....	606,119	961,879	265,760
North Dakota.....	34,235	57,476	23,241
Oklahoma.....	9,672	11,742	2,070
Oregon.....	1,344,046	1,925,987	581,941
South Dakota.....	150,914	188,382	37,468
Texas.....	1,150,542	1,687,447	536,905
Utah.....	1,700,550	2,359,244	658,694
Washington.....	637,151	836,795	199,644
Wyoming.....	1,831,039	2,564,668	733,629
Total.....	26,020,477	35,890,821	9,870,244

In addition to the Federal reclamation projects, private enterprises and State enterprises under the Carey Act are constantly adding to the irrigated acreage. At the present writing no desirable land is open to settlement in any of the Federal projects, but from time to time, as the works are extended, units will be opened for entry. The prospective settler who wishes to acquire an irrigated farm should be on the alert for announcements of openings.

No definite data have been collected on the amount of land that it might be possible to irrigate, outside of the projects under way. A rough estimate places it at between 15 and 18 million acres. The Reclamation Service and the State enterprises began with the units that were easiest and cheapest to develop. The development of the remaining units will be increasingly expensive, and no doubt will be taken up only as the demand for land and its increasing value offset the cost of development. However, this ratio will be influenced by the fact that engineers and water users are perfecting ways of increasing the service that may be obtained from a given amount of water. These improvements will also, no doubt, increase somewhat the area that may be irrigated.

Irrigation in the semiarid West has long passed the experimental stage. It is an established method of farming, and it may be inferred from the above figures that the area so farmed will gradually increase as increased population, land hunger, and demand for food justify it.

It is impossible in the space available to give a detailed description of topography, climate, or crop possibilities of the irrigable land. There are the hot, dry valleys of the Southwest, with a semitropical temperature the entire year; there are high cool mountain valleys

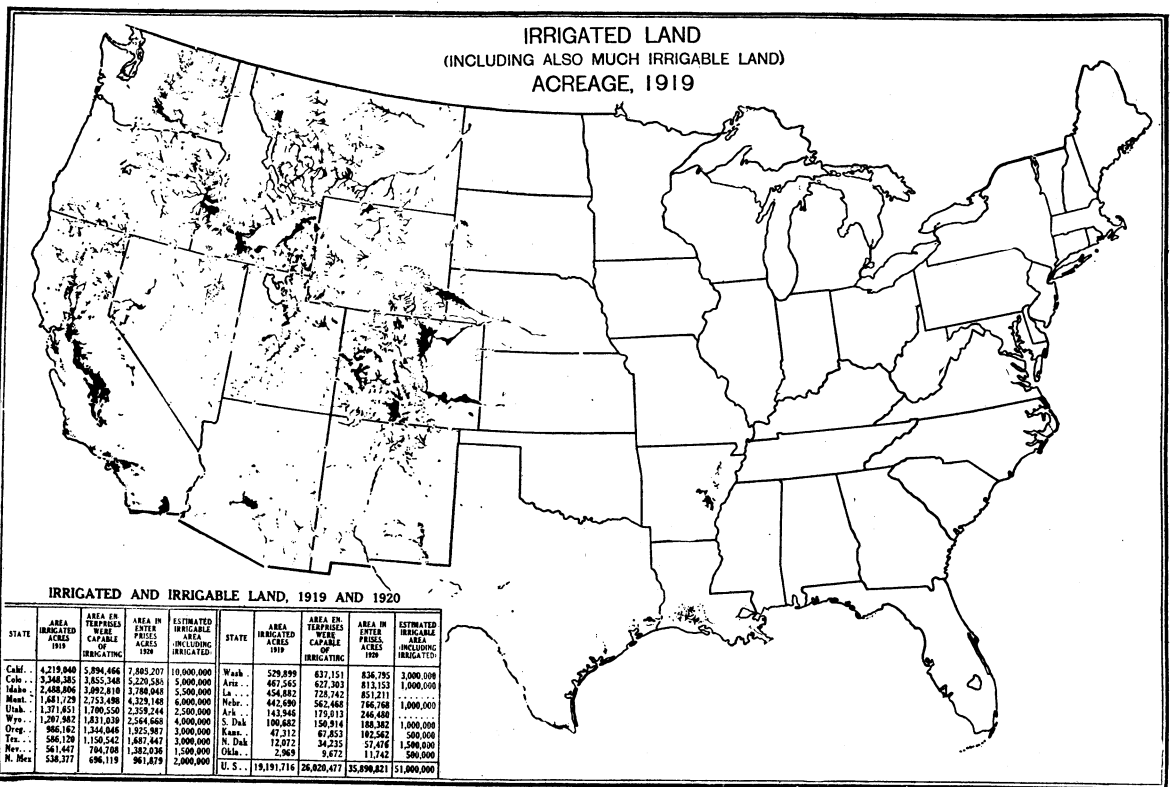


FIG. 4.—Location of irrigated areas. Much reduced and generalized from State maps prepared by the Bureau of the Census and then checked and corrected by the State irrigation engineers upon the request of the Office of Irrigation Investigations Bureau of Public Roads, U. S. Department of Agriculture. Most of the areas have necessarily been exaggerated, so that the map represents a picture, sufficiently accurate for a general conception, of the potentially irrigable as well as the present irrigated areas. (Prepared for the Graphic Summary of American Agriculture of the 1921 Yearbook of the U. S. Department of Agriculture.)

and plateaus in the Northwest, with cold, dry winters and summer frosts; there are sections with an annual rainfall too scanty to measure; sections with dry, sunny summers and winters of torrential rains; and regions all along the scale between these extremes.

The variation in irrigated crops is as great as the variation in physical conditions. Date palms, citrus groves, and cotton grow in the Southwest; the sugar beet and potatoes are cash crops in Colorado and other States; apples and other hardy fruits are leaders in the Northwest; all of the cereals are found in one region or another; alfalfa is grown everywhere, and mountain-meadow hay grows in the higher valleys. Alfalfa occupies the largest acreage and represents the largest value of all the irrigated crops.

The soil is usually very rich in minerals, because there has not been enough rainfall and movement of ground-water to leach it. Sometimes there is a scarcity of humus, but usually the desert vegetation has supplied this element. Clearing the land of sagebrush and other shrubby growth is neither difficult nor expensive.

On the irrigated tracts water may be applied to the growing crops at just the right time and in the quantity needed, and it may be withheld when a supply would be injurious. Also, the preponderance of clear days and even temperature stimulates growth. As a consequence of fertile soil, water control, and uninterrupted sunlight, there is usually a larger production per acre from irrigated fields than from fields depending upon rainfall, other things being equal.

Community life in an irrigated project is made possible and almost imperative from the nature of the enterprise. The reclamation act limits to 160 acres the size of the unit to which water may be supplied from the Federal works and requires the owner to reside upon his holding and cultivate it. As a matter of fact, the tendency is to divide these tracts into even smaller holdings. Hence the projects are closely settled and isolation is reduced to a minimum. The law also provides that after certain conditions have been fulfilled the entire irrigation plant shall be turned over to the district and that the district shall be responsible for its operation and maintenance. This joint ownership calls for cooperation and community action.

DEVELOPING AND IMPROVING.

Prospective settlers frequently may not realize how much money has to be spent to improve and develop an irrigated farm. The Government does not charge the entryman for his homestead, but does charge him for the cost of reclaiming it. This cost has varied from \$10 to \$200 per acre and will increase as the more difficult projects are developed. This does not provide for the individual lateral ditches on the private holdings, nor for leveling and throwing up the borders. These improvements may cost anywhere from \$20 to \$85 per acre. To this must be added the outlay for buildings, fences, machinery, other implements and tools, livestock, etc. Each

year the settler must pay a water rental varying from 50 cents to several dollars per acre, and his ditches must be kept in repair and clear of silt and vegetable growth.

The prospective purchaser of these lands should bear in mind the following points for careful investigation:

Drainage.—There is a tendency for irrigated lands to become waterlogged. Irrigation water not removed by natural drainage nor used by crops raises the ground-water table until it comes so near the surface that it drowns the roots of crops, and sometimes floods the fields, converting them into marshes. The prospective settler should make sure that the land is naturally drained or that artificial drainage has been provided.

Alkali.—Where the surplus irrigation water is not drained out of the soil, some of it rises to the surface by capillary attraction, evaporates, and leaves on or near the surface its load of dissolved minerals. In course of time the surface becomes so impregnated with the salts that plants can not grow in it. The land is then said to be alkaline, and can be reclaimed only by thoroughly washing it by means of heavy applications of irrigation water after adequate drainage has been provided. This process requires more than one season and is expensive. Large areas of land are alkaline through natural causes and the settler should avoid them. Lands impregnated with white alkali are easily recognized, but black alkali can not thus be detected. However, the native vegetation is one of the best indicators of its presence. Other things being equal, it is safe to reclaim sagebrush, cactus, or buffalo-grass land, as these plants will not grow on soil containing much alkali. On the other hand, greasewood, shadscale, and salt grass all indicate the presence of alkali in injurious quantities. No practicable method has been discovered to destroy alkali except by drainage or washing with water, and these methods are frequently uneconomical.

Subsoil.—An impervious layer of hardpan, clay, or other nonporous compact substance lying between the first and fifth foot of soil and subsoil is to be avoided, because it prevents the downward movement of soil water and of plant roots. A very porous substratum of coarse gravel is also to be avoided because it allows the soil water to escape too readily. Fine clay subsoils are sticky and heavy when wet, bake and crack when dry, take irrigation water very slowly, and are slow to warm up.

Surface.—The cost of leveling and ditching an even-sloping surface is about one-third the cost of preparing a surface broken by ravines, dunes, hog-wallows, or other minor irregularities.

Water supply.—The farm already under ditch and supplied by a Reclamation Service enterprise is reasonably sure of an adequate water supply. Further development of new projects depends upon appropriations by Congress, and prospective settlers should recognize the uncertainty involved in investing in any proposed project until an act covering the project has actually been passed authorizing the expenditure of the money for its development.

Water rights.—Water is supplied through Federal, State, or private canals. Some canals carry a full volume during flood seasons and a diminished volume at other times; some fail to supply a late irrigation for crops like alfalfa, potatoes, etc.; and some carry no water after the spring floods. Each State has individual laws controlling the supply and distribution of water. The variations and complications arising are extremely annoying and difficult to understand. Water rights and water supply are definite and stabilized in the old established private projects.

The value of a contract right depends somewhat on the following points: (1) Efficiency in canal management; (2) equitable and adequate distribution of water; (3) sufficient working capital to meet all necessary expenses and emergencies; (4) permanency and stability of the canal system. Private com-

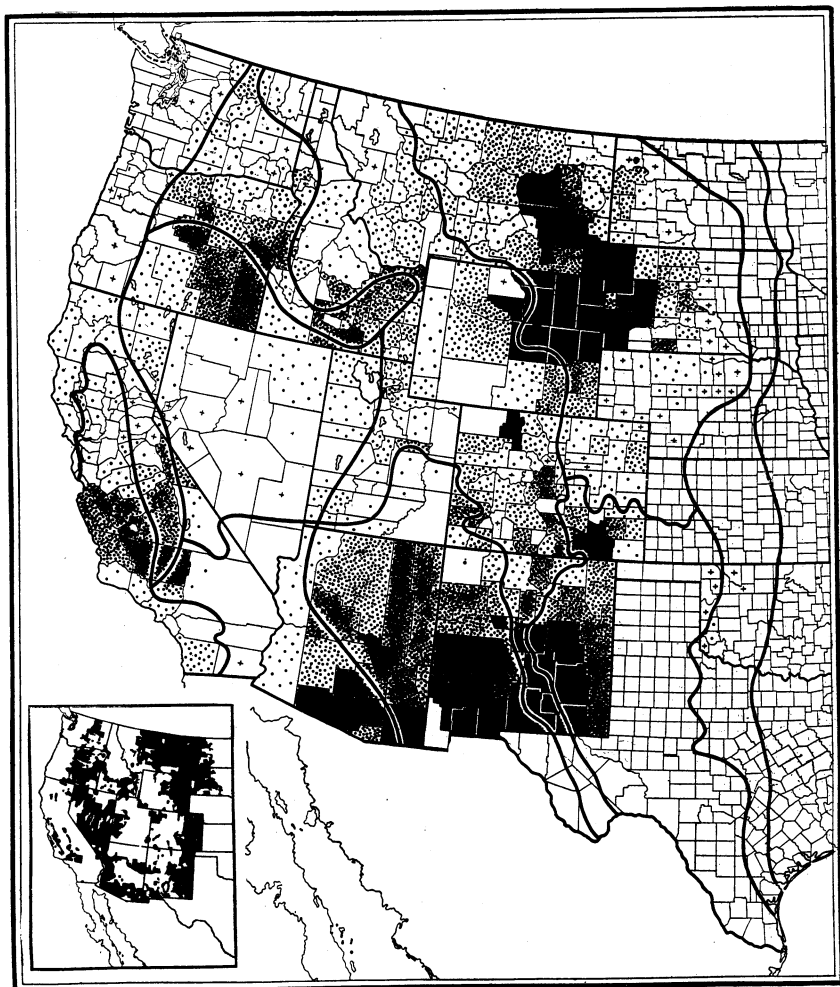


FIG. 5.—Land designated as stock-raising homesteads of 640 acres; inset, land designated as enlarged homesteads of 320 acres. In the dotted areas practically all of the land has been entered. In the black areas some land is open to homestead entry. The chief value of the map is to show that part of the public domain which has been classified as adapted to stock raising and not to cultivation. A comparison of this map and the map, Fig. 8 ("Land Available for Homestead Entry"), shows that much of the remaining public domain lies in this class of land. Each dot represents 5,000 acres.

panies have been known to break down and go out of business just when the farmers were helpless without water.

Experienced irrigation farmers know all of these pitfalls and how to avoid them, but the inexperienced purchaser from the humid

regions must be on his guard, and above all he must realize that farming under irrigation differs widely from farming in the region of rainfall.

DRY-FARMING AND GRAZING LANDS.

As the margin of settlement was pushed gradually outward into the regions of decreased rainfall and increased alkali and rough land, it was found that beyond a certain point the 160-acre unit was not adequate for a homestead. Thence westward general farming by the methods used in the humid regions could not be successfully carried on, and the carrying capacity of 160 acres of the grazing lands was not sufficiently high to yield a living for the ranchman. Dry farming called for a double portion of arable land. The Kinkaid Act passed in 1904 and applying to northwestern Nebraska, which provided for homesteads of 640 acres of grazing land, offered one solution for the problem of opening up these marginal lands to settlement. Later, in 1909, the enlarged homestead act was passed, under which the entryman could file on 320 acres of land, providing it had less than 20 acres of irrigable land. In 1916 the stock-raising homestead act was passed, which authorized the entryman to file on 640 acres of land, providing the land has a carrying capacity sufficient to feed a herd large enough to make a living for the ranchman, less than 5 acres of irrigable land per 40 acres, and less than 80 acres suitable for dry farming. One hundred million acres have been designated to date as lands falling under the specifications. (Fig. 5.)

The above-cited units were supposed to be the minimum units on which a man with a family could make a living under existing conditions. General experience, however, has been to the effect that they are not adequate for a paying business, except under the most favorable circumstances and expert management.

Dry farming, under the accepted practice and state of knowledge, is confined to regions of less than 20 inches and more than 10 inches of rainfall. However, this statement will not hold good in regions of very high or very low evaporation. Other things being equal, there is a possibility under dry-farming methods of producing a crop each year in a region of more than 15 inches of rainfall; it is usually possible with from 10 to 15 inches of rainfall to produce crops if the land is sown and fallowed in alternate years; areas of less than 10 inches usually have not sufficient moisture for profitable dry farming as carried on at the present time. There is an exception to this statement in an area in the Columbia Basin in southern Washington and northern Oregon, where successful crops of wheat have been grown with 9.5 inches of annual precipitation. Probably not more

than 10 to 20 per cent of the area lying between the 10-inch and 20-inch rainfall lines (Fig. 6) is suitable for dry farming because of unfavorable physical conditions.

Much depends on the seasonal distribution of rainfall. Dry-farming regions may be divided into three sections, according to seasonal rainfall: (1) The Great Plains area, with the major portion of the precipitation in June, July, and August; (2) the intermountain region or high interior plateaus, with late winter and early spring

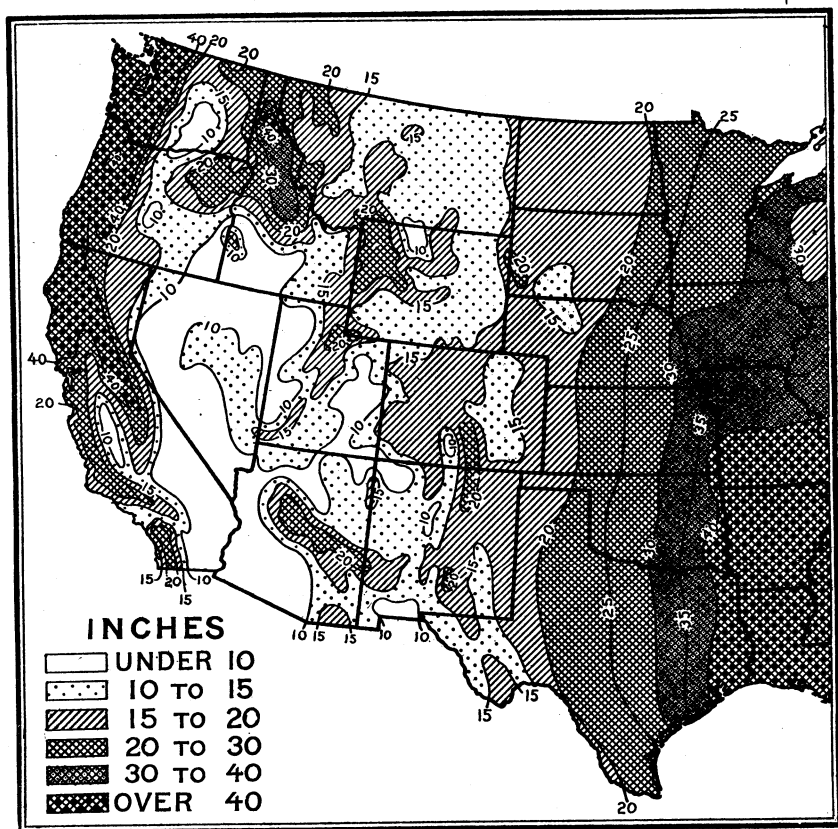


FIG. 6.—Average annual precipitation. (Rain, snow, sleet, and hail.)

rain; and (3) the Pacific Coast region, with winter rains. Because of the difference in distribution of rainfall each region has its special crops and farm practices. One of the greatest problems of the inexperienced settler is to learn how to conserve the moisture in the soil and to select crops suited to the conditions of the growing season. Such crops must either mature in a season short enough to avoid the serious drought or be able to endure a period of drought and then resume growth when moisture is obtainable. Wheat, rye,

barley, oats, and corn fulfill the first qualification and the numerous sorghums fulfill the second.

Many hundreds of abandoned dry-farm homesteads scattered throughout the entire region indicate that dry farming is a precarious undertaking for the inexperienced and uninformed farmer.

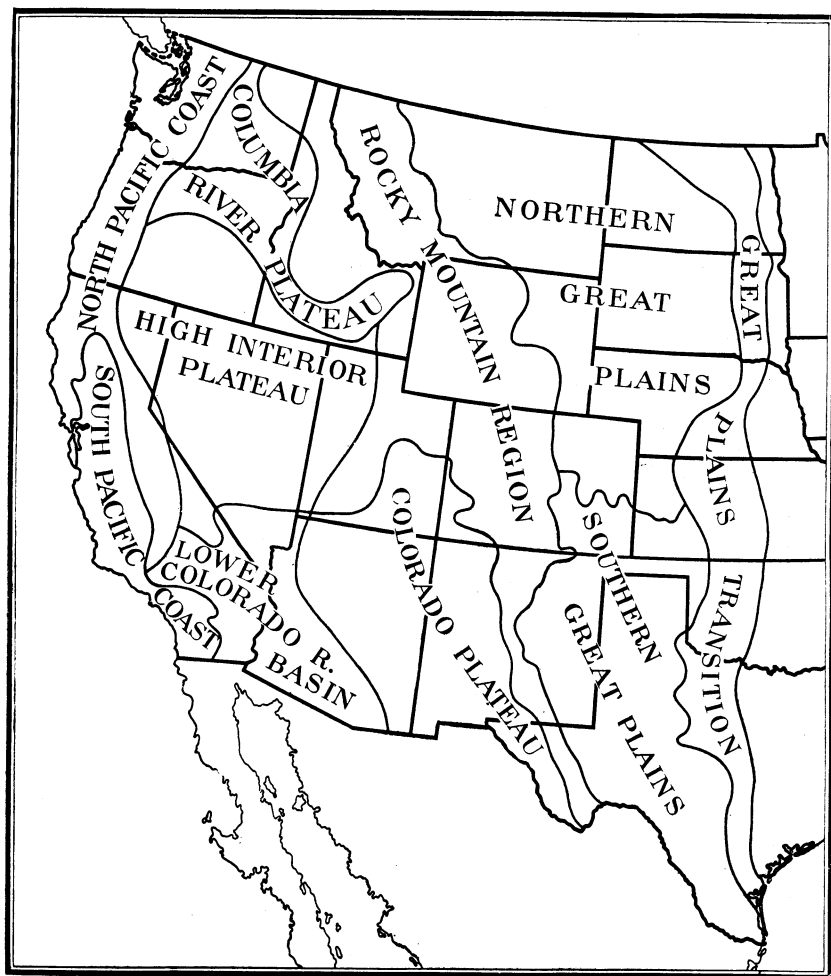


FIG. 7.—Geographic regions.

The Land Classification Board examined one block of land on which 247 out of 250 claims have been abandoned. The operators who have grown forage crops and raised cattle have been most uniformly successful. The farmer must resign himself to a small yield per acre and to the application of an extra amount of work to the fields lying fallow. However, these conditions are supposed to be counterbalanced by cheaper land and a larger farm unit,

so that the returns on the capital invested are supposed to compare favorably with other types of farming.

DESCRIPTION OF AREA.

Irrigation, dry farming, and grazing are intermingled over the same extent of territory. Irrigation occupies the river valleys where conditions are favorable; dry farming occupies the higher benches, second bottoms, or terraces, and a small part of the uplands; and grazing occupies the remainder of the land up to the line where the land is unfit for agricultural use. This entire section falls naturally into the physiographic divisions indicated on the map. (Fig. 7.)

Topography.—The Great Plains are a continuous series of gently rolling slopes, broken here and there by deeply cut valleys, a few ridges, and broken or rough land near the stream courses. So far as topography is concerned, a very small percentage of the land is unsuited for agriculture.

A large part of the Rocky Mountain division is made up of lofty mountains and steep slopes and is unsuited for any kind of agricultural use. Some valleys are irrigable, and the gentler mountain slopes, the foothills, the high plateaus, or so-called parks, are suitable for grazing. In the High Interior Plateau, great elevation, 4,000 to 5,000 feet, and great aridity are the most striking characteristics. The surface is smooth to roughly rolling, and is broken in places by parallel mountain ranges trending from north to south and by low, continuous lava rims. There are a few canyons, some from 500 to 1,500 feet deep.

In the Colorado Basin the surface is made up of rolling to rough, high, rocky plateaus, cut by numerous deep, steep-walled canyons, and abrupt escarpments or steps.

The Columbia Plateau varies in elevation from 96 feet at The Dalles, in Oregon, to several thousand feet in the highest parts. The surface is extremely diversified—flat open plains, canyons, rugged hills, coulées,⁷ benches, intricately dissected regions, dunes, and mountain ranges.

The Pacific Coast area is made up of mountains, smooth intermountain valleys, broad, rolling river valleys, and high, lava-covered plateaus, almost without vegetation.

Climate.—The summers in the northern part of the Great Plains are hot, dry, and windy, and the winters are characterized by severe, dry cold. Farther south the summers increase in length and the winters decrease in severity, but the aridity increases even under the same amount of rainfall, owing to excessive evaporation.

In the high plateaus aridity and great seasonal range of temperature are the most striking climatic features. In the High Interior Plateau or the Great Basin the very small amount of rain comes in late winter and early spring, and evaporation is unusually rapid during the summer. Southward in the Colorado Basin the rainfall comes in July and August, and this factor more than temperature and frost limits the length of the growing season.

The Columbian Plateau and the Pacific Coast region have winter rains ranging from over 100 inches near the coast to less than 14 inches in the interior. There

⁷ The word "coulée" is here used as locally understood to mean a narrow inclosed valley or a dry water course.

is no frost-free season in the higher portions of the Columbia Plateau, and the winters are cold. Near the coast the winters are usually mild and the summers cool, except in the intermountain valleys, where the summers are exceedingly hot, dry, and dusty.

Vegetation.—The Great Plains is a typical grass country; trees are a rarity except along the stream courses. Far and wide the smooth, gently undulating surface was formerly covered with a thick growth of nutritious grazing plants—buffalo grass, grama grass, wheat grass, June grass, bunch grass, and poa. Buffalo and grama grass cure on the ground and afford good grazing even after they are brown and dry. The ground is seldom covered with snow, and in the days of early settlement cattle and horses grazed in the open during the entire winter. Overgrazing has so depleted the range that this practice is no longer generally possible.

Toward the west the elevation of the Great Plains increases, and the rainfall decreases. The grazing grasses give way to the less desirable needle grass, wire or three-awn grass, sand grass, and bluestem. On the mountain sides the grass type is replaced by the brush type of vegetation, but the grasses prevail in the valleys, the high basins or parks, and on the fairly even-topped plateaus. The vegetation in the mountains is always sparse, except in a few favored spots, and much of it is not edible for livestock.

In the High Interior Plateau sagebrush is the most conspicuous and wide-spread type. Nutritious grazing grasses grow among the sagebrush. The grazing plants of the Southwest are curly mesquite, grama, tobosa, and wheat grass. However, there are numerous varieties of woody, hairy, resinous, drought-resisting plants and shrubs that have little value as stock feed. In the northwestern plateau section bunch grass is the dominant grazing plant, and it is supplemented by fescue grass, bluegrass, and others. Very wide stretches of alkaline land throughout the entire high plateau and high basin regions are either destitute of vegetation or support shadscale, greasewood, salt grass, and other alkali-resistant plants.

In the Pacific Coast region the dominant type of vegetation is mountain brush. Where the trees and brush are not too thick, weeds and grass find a place. Some slopes support a sufficient number of oak trees to furnish mast for hogs.

GRAZING.

Other things being equal, the grazing value of this territory depends upon the supply of drinking water for the stock, the carrying capacity of the range, the length of the grazing season, and the possibility of growing hay and forage.

The Land Classification Board, in making designations for enlarged and stock-raising homesteads, has estimated the carrying capacity of over 100,000,000 acres. They used one section—640 acres, or 1 square mile—as a unit of grazing land. In making the estimation the question of a winter supply of forage also was considered. The highest carrying capacity was found in the Great Plains, where the range will carry from 18 to 80 head of cattle per section from 6 months to an entire year. Some areas in the Columbia Basin will also carry 80 head, but the capacity of the poorest land runs as low as 2 per section. Some sections in the Great Plateau regions covered with alkaline plants will not support more than one head

per square mile for a season of 3 months, and there are large areas in the high mountains of the Rockies and the Pacific coast regions that have no value for grazing. The very best lands among the mountains have a carrying capacity of 30 to 65 head per section. In the Southwest, on the hot dry plains, 10 to 30 head may be pastured on a section during the season.

The length of the grazing season varies from 3 months in the poorest regions on the plateaus, to the year round in the southern part of the Great Plains, some parts of the Columbia Basin, and in a few small areas along the margin of the Pacific Ocean. The average is between 7 and 8 months of grazing and 4 to 5 months of winter feed. There is but little free range left, except in the Northwest, and the best stockmen feed during at least 4 months. Most of them feed 6 months. Under good conditions and in an open winter 1 ton of forage will carry 1 head of stock through the closed season. In many parts of the Colorado Basin supplementary feeding may not be necessary, except in unusually dry years. Near the Pacific Coast, owing to winter rains and mild temperature, where the forests and brush are thin, winter grazing is successful. In some parts of the Columbia Basin the live stock is pastured in the highlands during the summer and in the autumn is driven to the lowlands for winter grazing.

In regions of scanty rainfall the supply of water for stock and domestic uses is a dominant factor in the grazing industry. Grazing land is worthless without drinking water for the stock. On the high, arid plateaus, where the permanent streams are in the bottoms of inaccessible canyons, and where there are no reservoirs of winter snows, the question of water supply is frequently serious. In the Rocky Mountain region, in most of the Columbia Plateau, and in much of the Pacific Coast region mountain streams and springs, fed by melting snows, furnish sufficient water for as much stock as can be grazed on the ranges. On the Great Plains and on the central and southwestern plateaus stock are watered from wells, springs, streams, ponds, and from artificial reservoirs, locally called "tanks." There are very few accessible intermittent streams, and still fewer permanent ones. Most of the springs are found at elevations between 4,000 and 9,200 feet. Wells are the main standby, but are expensive to bore, to equip, and to maintain. Artesian wells have been made on the High Interior Plateau, but the flow of water is very scanty and the water is alkaline. Most of the deep wells, especially in the Southwest, have alkaline water, sometimes too alkaline even for the stock. Frequently the cost of equipping a ranch with adequate watering facilities mounts to thousands of dollars.

In sparsely settled regions a single ranch company is sometimes able to control as much as 100 square miles of grazing land by acquiring title to all the available watering places and barring out from the water all stock but their own. To prevent such action the Department of the Interior, during the past five years, has been withdrawing from entry all springs, watering holes, and watering places and holding them accessible to the general public. Over 226,000 acres have already been withdrawn for this purpose.

CROPPING.

The climate, taken as a whole over the entire plateau regions, is adverse to crop growing. All of the good arable land has been selected long ago, and stock raising is practically the only chance left for the prospective settler on homestead land. Much of the unentered land classified as stock-raising homesteads is barely up to the requirements of the Land Classification Board. Trying to make a living from 640 acres of that kind of land may be in many cases an extremely hazardous undertaking. The carrying capacity is so low that the unit is often too small to support a paying business. The original homestead in these regions should be augmented by buying or leasing State land, railroad land, or private land. National forests afford supplementary grazing facilities for ranches located in the vicinity of the forest ranges.⁸

Winter feeding makes it imperative that the settler control enough cultivable land to supply his herds with hay and forage during the winter. It is not usually good business to stock up with more cattle than one can feed with hay from his own land. Hay in this region is frequently very high in price, especially during the feeding season.

In the Great Plains area and in the Columbia Plateau, stock raising combined with dry farming is successfully carried on over large areas. Wheat, rye, and barley are the grain crops, and grain cut green for hay, and alfalfa are the standard forage crops.

In the Upper and Lower Colorado Basins the soils are sands, dry sandy loams, and alkalies, and are not easily adapted to dry-farming methods. However, dry farming seems to succeed on elevations between 7,000 and 7,500 feet and in the edges of the foothills. The sorghums are a reliable crop. Other crops are beans, wild and tame hay, and the cereals. Crops are not produced with any degree of regularity and the areas suitable for dry farming are very small. The largest part of the area can be used to the best advantage for grazing. In the enlarged homestead and stockraising homestead areas

⁸ The Forest Service, Department of Agriculture, publishes rules and regulations for grazing in the national forest.

of the Pacific Coast section the cultivated areas are in small patches of from 1 to 5 acres in extent, and lie in narrow strips along the streams. To the forage crops cultivated are added potatoes, fruits, and garden products. Here, as in the other regions, the land is best used for grazing, and it is not very good for that purpose. The areas under irrigation have already been discussed in the section on irrigation.

Points to investigate.—The prospective entryman should investigate the length of the growing season and the length of the time he must feed his stock, the type and density of the forage vegetation, the carrying capacity of the 640-acre stock-raising homestead, the possibility of supplementing the grazing area, and the water supply. The purchaser who takes a stock-raising homestead without seeing it or who trusts to some professional locator or land company to select it for him may, on arrival, find himself in possession of 640 acres of land that will support but two or three head of cattle per year.

FEDERAL AND STATE AGENCIES OFFERING INFORMATION.

The Federal Government has established agencies as cited below which will furnish reliable information about available farm lands:

1. The General Land Office, Washington, D. C., gives information about public land open to homestead entry. The Land Office has published a number of bulletins designed to give suggestions to people wishing to homestead which will be sent free to inquirers on application.

2. The Reclamation Service, Washington, D. C., has charge of the land being placed under irrigation, and publishes for free distribution descriptive material about the different projects designed to aid homesteaders or purchasers.

3. The Commissioner of Indian Affairs, Washington, D. C., and the Superintendent of the Five Civilized Tribes, Muskogee, Okla., are the proper sources of information about Indian lands. These offices should be consulted before money is invested with individuals or companies posing as agents for Indian lands.

4. The Division of Land Economics in the Bureau of Agricultural Economics answers individual inquiries about the agricultural conditions and possibilities of various localities.

Agencies as follows have been established in different States:

1. A State land office located in the capital of the State in charge of State and school land.⁹

2. A State department of agriculture, which collects and distributes statistical information about agricultural subjects.

⁹ See Appendix for addresses.

3. Lists or booklets of farms for rent or sale.¹⁰
4. Commissions or bureaus of immigration to induce settlement and development in the State.¹⁰
5. Each State maintains an agricultural college and one or more agricultural experiment stations. Free bulletins are distributed which treat of many phases of agriculture in the State. A director of extension work is connected with the agricultural college in each State and is conversant with the conditions in his State.
6. A majority of the counties in the United States maintain a county agricultural agent who is a trained agriculturist and is thoroughly alive to the conditions of his county and can furnish first-hand, definite information. The name and address of any county agent may be had by writing to the State extension officer at the State agricultural colleges.

HOMESTEADING.

The homestead laws as they stand to-day provide for four classes of entries:

1. Ordinary.—160-acre farm of agricultural land.
2. Enlarged.—320-acre farm of semiarid land.
3. Grazing.—640 acre-farm of land suitable for stock raising.
4. Reclamation.—10 to 160 acre farm unit under the reclamation act.

The character of the unappropriated land (Fig. 8) has been discussed in the section on dry farming, irrigation, and stock raising.

The prospective entryman should get the latest annual circular, "Vacant Public Lands," from the General Land Office and study it carefully, using at the same time the map, Figure 8, in order to find out the relative location and the amount of land still open to homestead entry. In order to acquire title to a homestead, the prospective entryman must go through the following steps:

1. Get from the United States Land Office diagrams showing, by townships, the vacant land open to homestead entry.
2. Make a personal inspection of the land. An applicant who employs a locator should require him to furnish a sworn statement in writing, giving the approximate character, quality, and topography of the tract selected, and he would be further protected by a stipulation in the contract of employment that he will not be required to make any payment until he has examined the land and found it to be substantially as represented.
3. Make entry in the local land office in person. The entry fee varies from \$12 to \$24, depending on the size of the homestead.
4. Initiate settlement by personally placing improvements on the land.

¹⁰ See Appendix for addresses.

5. Within a reasonable time after entry—3 to 6 months—take up actual residence on the land and remain there permanently for a period of at least 3 years.

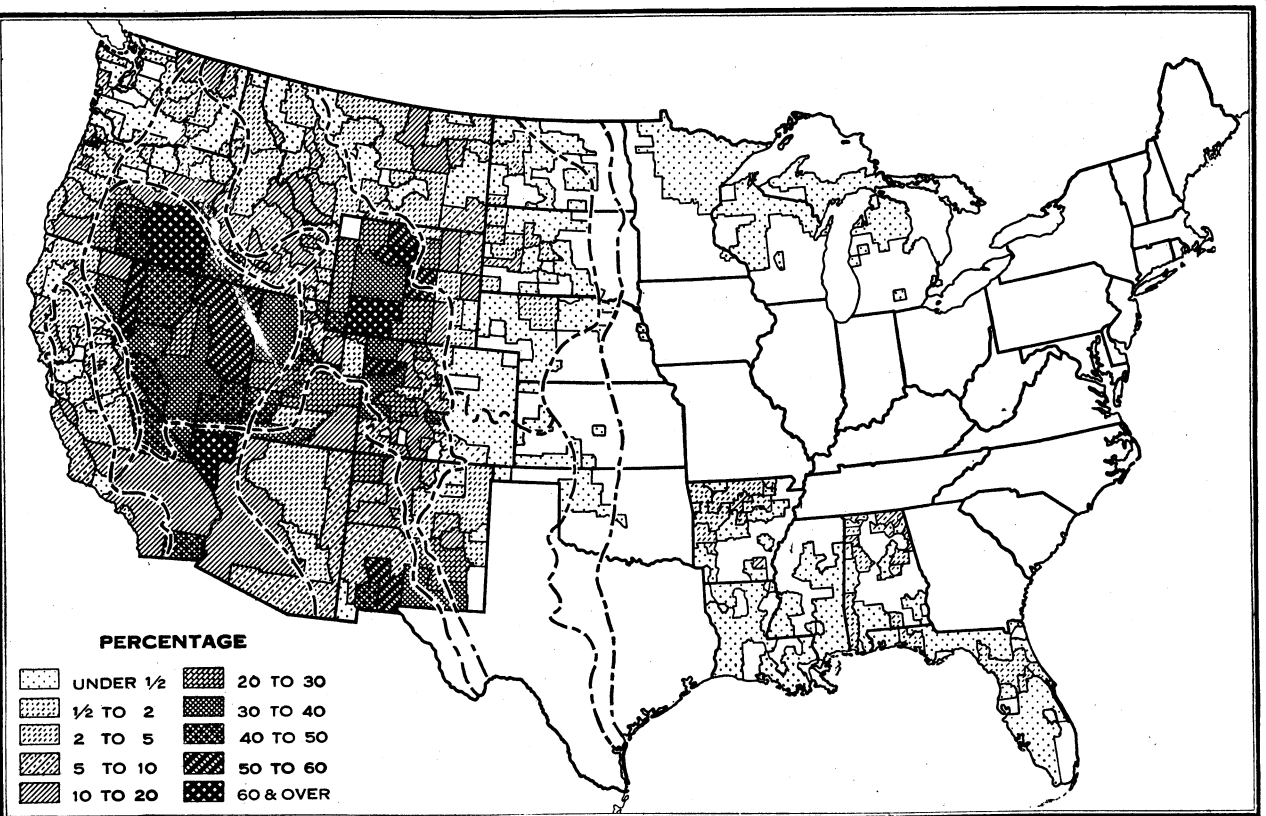


FIG. 8.—Percentage of county area available for homestead entry.

6. Cultivation of the land for a period of at least 2 years is required. No cultivation is required under the Kinkaid Act in

Nebraska. The stock-raising homestead law requires no specific area of cultivation, only that the land must be actually used for raising

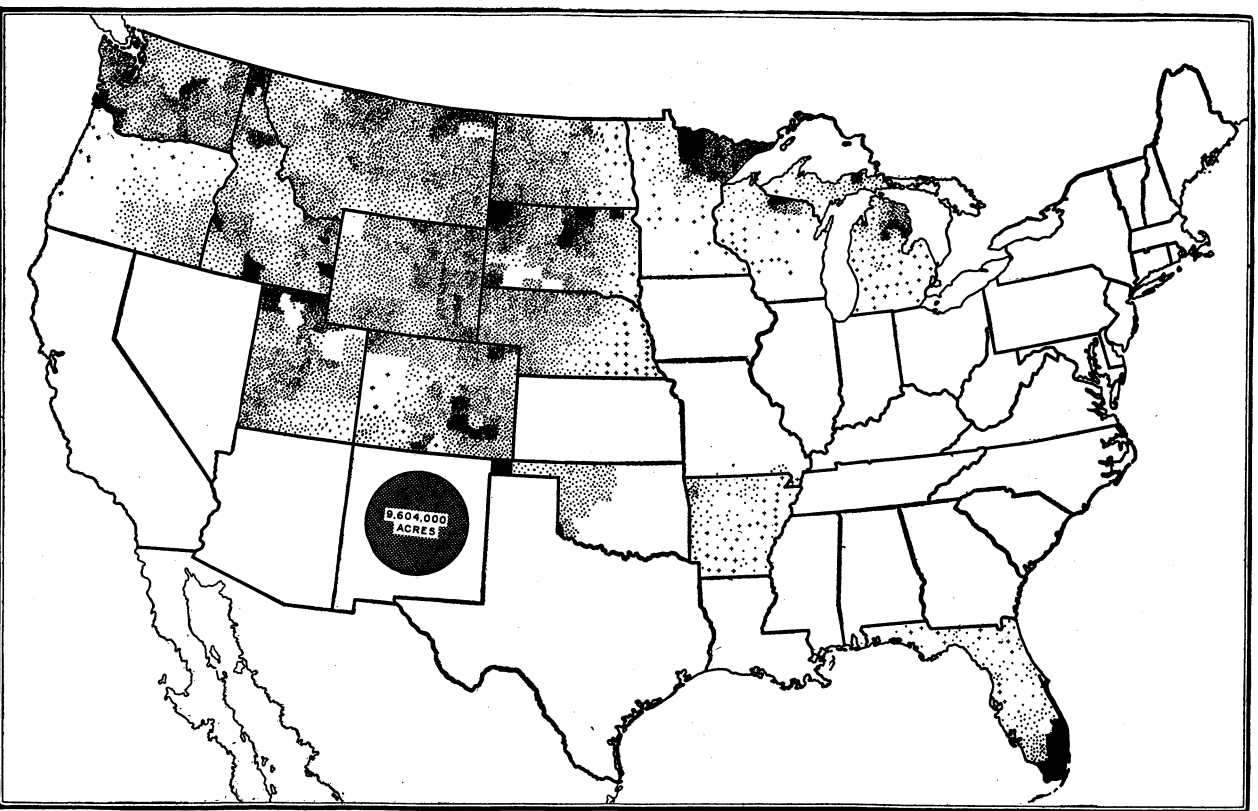


FIG. 9.—State and school lands subject to sale or lease. Each dot represents 2,000 acres. + represents less than 2,000 acres.

stock and forage crops, and that it must be improved under certain conditions.

7. The settler may "prove up" on his homestead and secure clear title after 3 years' residence and cultivation. The fee is from \$12 to \$15. Specific directions for all applications, entries, final proofs, etc., may be obtained from the General Land Office, Washington, D. C., or at the local district land office.

ACQUIRING BY PURCHASE.

Raw or undeveloped land in the United States available for purchase is in the ownership of States and Territories, private individuals, companies and corporations, and Indians.

STATE AND SCHOOL LANDS.

State and school lands (Fig. 9) are under the control and supervision of the commissioner in charge of public lands, located in the capital of each State.¹¹ The land is sold at public auction in the county seat of the county in which it is located after due advertisement in the local papers. This is not true of Nevada, where State lands are sold on application. Table 4 is a summary of the policy of disposing of State land by the several States:

¹¹ See Appendix for addresses.

TABLE 4.—*Terms under which State lands may be obtained.*

State.	Amount.	Whether sale or lease.	Size of sale unit.	Size of lease unit.	Selling price.	Terms of sale.		Term of lease.	Annual rent per acre.
						Per cent in cash.	Balance due in—		
Arkansas.....	<i>Acres.</i> 221,840	Sale.....	<i>Acres.</i>	<i>Acres.</i>	Minimum \$2.50.....				
Colorado.....	3,113,607	Sale or lease.....	640		Highest bid.....	10	18 years, 6 per cent interest.	None leased.....	8 to 75 cents.
Florida.....	1,417,685								
Idaho.....	2,444,700	Sale or lease.....			Minimum \$10.....	10	40 years, 6 per cent interest.	1 to 5 years.....	10 to 50 cents.
Indiana.....	7,500	Swamp land.....							
Louisiana ¹									
Michigan.....	648,173	Lease.....						99 years.....	Fixed by appraisal.
Minnesota.....	2,023,897	Sale.....			Highest bid.....			None leased except for minerals.	
Missouri.....	50,414	...do.....				33.5	3 years, 6 per cent interest.	None leased.	
Nevada.....	480	...do.....	960		Minimum \$1.25.....	10 to 20	50 years, 5 per cent interest.	...do.....	
Montana.....	4,349,570	...do.....			Highest bid.....				13.91 cents.
Nebraska.....	1,624,558	Sale or lease.....	640	640	Appraised value.....	10	20 years, 5 per cent interest.		6 per cent appraised value.
New Mexico.....		...do.....			\$3 to \$5 for grazing, \$25 for irrigation.	5	30 years, 4 per cent interest.	5 years.....	2 per cent of value.
North Carolina.....	500,000	Sale.....			Actual value.....			None leased.....	
North Dakota.....	1,546,985	Sale or lease.....			Minimum \$10.....	20	20 years.....	5 years.....	\$15 per section.
Oklahoma.....	620,000	All leased.....				5	40 years.....		4 per cent of value.
Ohio.....	5,000	Swamp land.....							
Oregon.....	676,918	Sale or lease.....			Minimum \$7.50.....			1 year.....	15 cents.
South Dakota.....	2,894,036	...do.....	80	640	Minimum \$10.....	10	30 years, 5 per cent interest.	...do.....	Highest bid.
Utah.....	2,493,399	...do.....	160, 320,	2,500	Minimum \$2.50.....	10	10 years, 5 per cent interest.	12 years for arid and grazing.	5 cents.
Washington.....	2,472,533	...do.....	2,560					5 years.....	10 cents.
Wisconsin ²	349,889								
Wyoming.....	3,588,772	Sale or lease.....	160		Minimum \$10.....	10	18 years, 4 per cent interest.		Highest bid.

¹ Lands withdrawn from market for reappraisalment.² Withdrawn from entry for reappraisalment.

The Board of Land Commissioners of Colorado publishes an atlas,¹² showing the location of State land and such general information as may be shown on a map. The board also publishes detailed reports of the different parts of the State. Not more than 640 acres may be purchased by one application, but as many sale applications as desired may be filed by the same applicant. This State issues "immunity leases," both grazing and agricultural, at an increased rental, which provide that the land will not be sold during the term of the lease except to the lessee or by his written consent. A straight grazing lease for land with no watering-place for stock calls for 8 cents per acre rental, but with a watering-place 12 cents per acre is required. An immunity lease with water on the land carries 15 cents per acre, but only 12 cents per acre without water.

In Michigan about half of the State lands are set aside for reforestation. That which is subject to sale or lease is in the cut-over district described in the section on cut-over land.

In Minnesota more than half of the State land probably will never be fit for agriculture, either because it is too rough or because the soil is infertile. The remainder is cut-over or heavily timbered.

In Missouri and Texas the State lands subject to sale are controlled by the curators of the university and are sold for university funds.

In Nebraska, in case of two or more applicants for the same lease, the lease goes to the person who bids the highest bonus in addition to the lease.

North Carolina has over 500,000 acres of State land that is all swamp land and much of it has never been surveyed. The tracts that have been reclaimed show large returns on the investment.

South Dakota offers between 50,000 and 150,000 acres for sale each year, and issues leases for agriculture as well as for grazing.

In Utah a settler may buy 160 acres of ordinary homestead land, 320 acres of dry-farm land, or 2,560 acres of grazing land.

Wyoming leases grazing land to settlers who have proved up on their homesteads.

Washington has large areas of good land that will eventually be placed on the market.

There are no restrictions about residence or cultivation on State lands. The settler acquires title by purchase and may do as he likes with the land.

CAREY ACT LAND.

In 1894 Congress passed the Carey Act, which enabled the Federal Government to grant to Washington, Oregon, California, Nevada,

¹² Atlas may be purchased for 50 cents from the Board of Land Commissioners, Denver, Colo.

Idaho, Montana, Wyoming, Colorado, North Dakota, South Dakota, and Utah desert land not to exceed 1,000,000 acres each. In order to take advantage of this act the State must undertake to irrigate it. For this purpose the State is authorized to contract with private individuals, cooperative bodies, or companies to reclaim and settle the land. The holders of the contracts assume all responsibilities for the reclamation and take a lien against the subdivisions of land reclaimed for all costs and necessary expenses. They must secure the approval of the State for the selling price asked of the purchasers, and they are held to a certain date for completing the enterprise. The land is thrown open to entry by the State when work has been inaugurated by the company. Notice of the opening is usually published in the local papers, with a statement of the price of the land and of the water rights. The settler may file upon 40, 80, 100, or 160 acres. He may file on Carey Act land, even though he has already exhausted his full homestead rights under the Federal Government. Requirements for residence, cultivation, and final proof are similar to those in other Federal homestead land laws.

A comparison of Figures 9 and 10 will enable the reader to note the dominant crops in the various regions where State lands may be purchased and get some idea of the type of farming in the locality in which he expects to purchase.

INDIAN LANDS.

The amount and distribution of Indian lands subject to sale or lease are shown in the Appendix, list 4.

The following Indian lands may be purchased:

1. Land belonging to any Indian 21 years of age or over who holds an allotment of land under a trust patent and wishes to sell.
2. Inherited lands.
3. Lands belonging to persons deemed by the Secretary of the Interior incompetent to farm them.
4. Lands released through reduction in size of reservations.

When land in a given reservation is available for purchase, the superintendent or officer in charge of the agency causes an advertisement of the lands offered for sale to be published once each week in a local newspaper, giving the Land Office description of the land, the time within which and place where bids for the land will be received, and other necessary information. Further information may be procured on application to the superintendent or officer in charge. Before any tract of land is offered for sale the superintendent visits it in person and appraises it at its full value for the purpose for which it is best adapted. The appraised value of each tract is published with the notice of the public auction. No bid for less than the appraised value is received.

The prospective purchaser should write to the superintendent of the agency for a list of the allotments to be sold and for all other

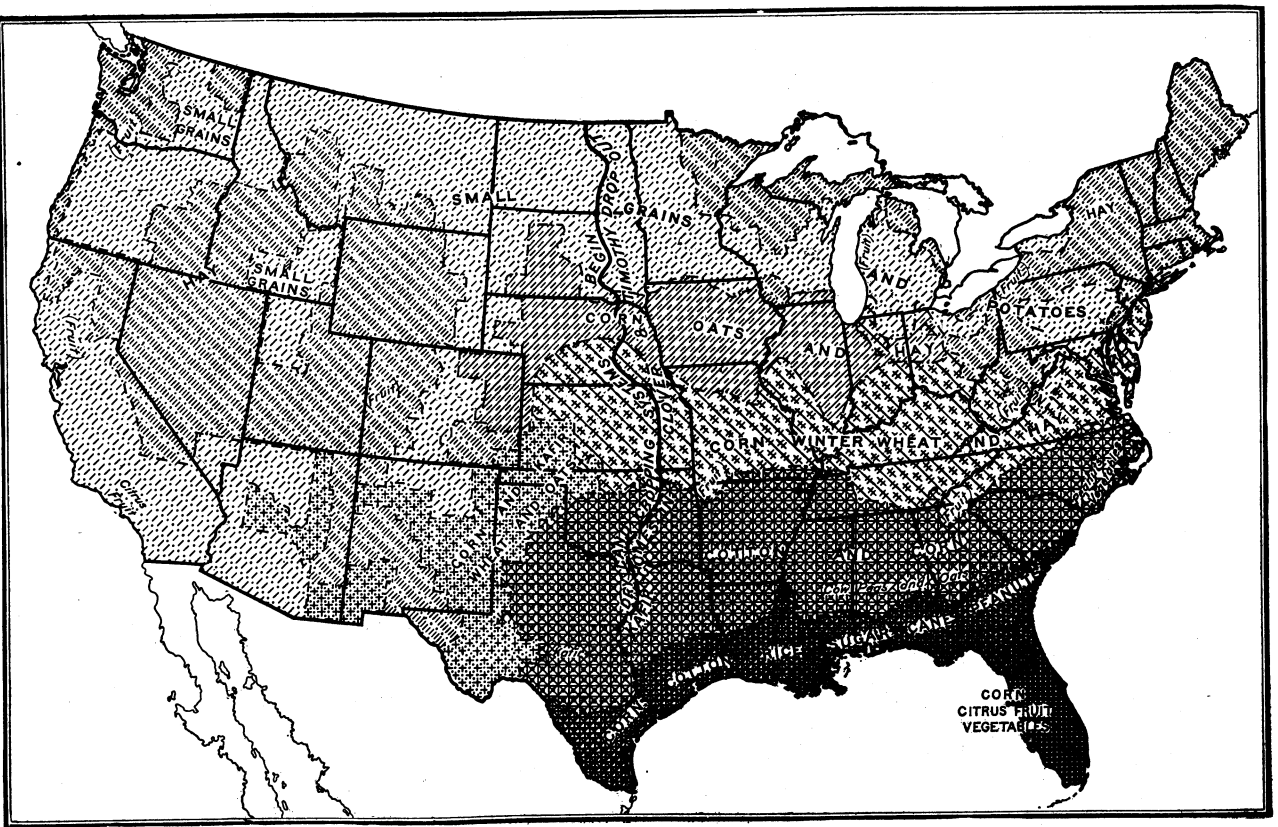


FIG. 10.—Crop belts, based on crop acreage, 1910.

available information. Each bid sent to the superintendent must be accompanied by a certified check for one-fifth of the amount offered.

No bidder is permitted to include more than one allotment in a single bid, but if he wishes to bid in more than one allotment he may submit a separate bid for each one. If the bid is accepted on a cash basis, the remainder of the purchase price, together with all fees and expenses for conveyance, must be sent to the superintendent within 30 days after the date of the notice that his bid has been accepted. It is the policy of the Secretary of the Interior and of the Commissioner of Indian Affairs to sell irrigable and agricultural land under the deferred-payment plan in order to encourage the sale of Indian land to actual settlers. The deferred payment plan is as follows:

Ten per cent of the amount offered accompanies the bid, 15 per cent additional of the purchase price is paid when the bid is accepted, and the remainder is paid on such terms and conditions as have been agreed upon between the superintendent and the Indian owner. The agreement usually calls for payment of the remainder in three, four, or five years in equal annual installments at interest at 6, 7, or 8 per cent. When the purchase price and the accrued interest have been paid in full, a patent in fee, or a deed, is issued to the purchaser. Residence on purchased land is not required.

Leasing policy for Indian lands.—The policy of the Department of the Interior has been to discourage indiscriminate leasing of allotments, but where leasing is proved to be the most beneficial use of the land for the Indian owners, leases are granted. In such cases allotments may be leased for three years for grazing purposes and five years for farming, mining, and business purposes. As a rule, no person, firm, or corporation is permitted to lease more than 640 acres of ordinary agricultural lands for farming purposes, or more than 160 acres of land under irrigation, or more than four full allotments where the land must be farmed under intensive methods and are allotted in amounts of not to exceed 10 acres for each individual. No limitation is placed on the amount of land for grazing purposes which may be leased by any one person, firm, or corporation.

Lands from diminished reservations.—From time to time, when conditions make it feasible, Indian reservations are diminished and the land thus made available is open to homestead entry. Applications to enter are sent to the superintendent of the agency. Assignments to successful applicants are made by number. Holders of successful numbers must then proceed as in filing on vacant public land, except that the usual filing fees and commissions must be accompanied by cash or a certified check equal to one-fifth of the appraised value of the tract selected. The remaining four-fifths of the appraised purchase price is due in three, four, or five equal annual installments, bearing interest. Residence and cultivation are required for final proof, just as for homestead entry on vacant public land. At the present time there is available land in the

Colville Reservation in Washington, the Fort Peck Reservation in Montana, the Southern Ute in Colorado, the Fond du Lac in Minnesota, and in the Pine Ridge in South Dakota.

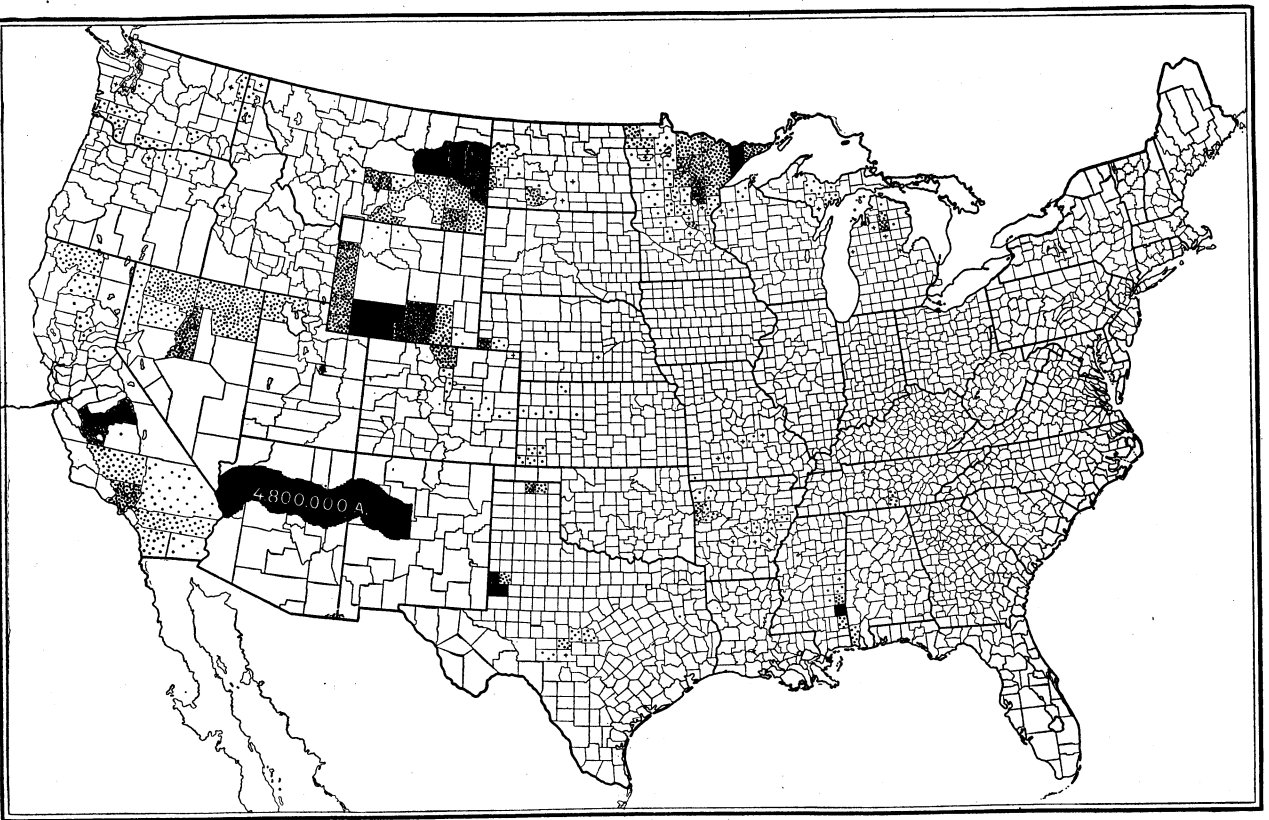


FIG. 11.—Railroad land open to sale or lease for cultivation or grazing. Each dot represents 500 acres. + represents less than 500 acres.

The available land in Minnesota, Wisconsin, and in Oregon are almost entirely in the timbered and cut-over regions. In Utah, in

the Fort Duchesne reservation, water is furnished with the land at the rate of 1 second-foot for each 70 acres under cultivation.

UNDEVELOPED LANDS IN PRIVATE HOLDINGS.

There are large areas of undeveloped land to be purchased from private agencies, such as railroad companies, lumber companies, individual owners, etc.

Railroad land.—Railroad lands for sale or lease for agricultural purposes are located as shown in Figure 11. The accompanying summary shows the area of such land by States, and the policies under which it is disposed of. Some of this land is held for sale only, while other tracts may be leased, but, lacking selection and survey, are not on the market for sale. The Northern Pacific, the Atchison, Topeka & Santa Fe, and the Southern Pacific have large holdings in the semi-arid regions of the West that are leased to cattlemen in large units, measured by townships rather than by acres, at a few cents per acre per year. A large ranch on such land in San Diego County, Calif., is being put under irrigation, and when the project is completed the land will probably sell for \$200 to \$400 per acre, depending upon the cost of development and the intrinsic value. Other tracts of land held by the railroads are timbered, cut-over, or semiarid, and are not first-class farm land. Considerable areas of railroad land in the cut-over district are peat. Aside from the irrigated tract just mentioned, the selling price quoted for the land varies from \$1 to \$40 per acre. The prevailing price is usually from \$2 to \$5 per acre. The terms of sale are generally either cash or a small fraction of the purchase price down, the balance in equal annual installments varying from 3 to 10 years, with interest at 6, 7, or 8 per cent.

One railroad in Minnesota cooperates with the soil department of the State University in developing ready-made farms. This includes clearing from 10 to 100 per cent of the farm unit, seeding a certain amount to grain and grass, supplying some buildings, a well, and fences, and financing the settler in the purchase of live stock. Many of the roads maintain directors of agriculture and real-estate departments in order to induce settlers to occupy the territory served by their lines, and in order to assist the settler to make a good selection of land and to advise him during the pioneer period.

TABLE 5.—Summary of railroad lands subject to sale or lease for agricultural purposes.

Company.	State.	Area.	Sale or lease.	Terms of sale.	Terms of lease per acre.
Northern Pacific..	Wis., Minn., N. D., Mont., Wyo., Idaho, Wash., Oreg.	<i>Acres.</i> 963,787	Sale or lease.....	\$2 to \$35 per acre 5 to 10 years, 8 per cent.	4 to 15 cents, sub- ject to cancel- lation.
Atchison, Topeka & Santa Fe.	.....	4,800,000	.....do.....	\$1 to \$40 per acre cash or annual payments, 6 per cent.	
	Tex.....	90,000	Sale.....	\$10 to \$35 per acre one-eighth cash, 6 per cent.	
	Kans.....	5,275	.....do.....	\$7 to \$20 per acre one-eighth cash, 6 per cent.	
	Calif., Ariz., N. Mex. {	8,600	.....do.....	\$200 to \$400.....	} 3 cents.
	.....	4,700,000	Sale or lease.....	\$1 to \$4.....	
Chicago, Rock Is- land & Pacific.	Ark.....	567,174	Sale.....	Timbered lands, cash; other lands, one-third cash; 6 per cent.	
	.....	17,548			
	Minn.....	76,723	.....do.....	\$2 to \$5 per acre, 6 per cent.	
	.....do.....	472,903	.....do.....	\$2 to \$5 undevel- oped; \$10 to \$15 for developed; 6 per cent.	
Chicago & North Western.	Mich.....	5,700	.....do.....	Market price; cash or one-fourth cash.	
Great Northern...	Minn.....	76,000	Sale or lease.....	Cash or 4 pay- ments of one- tenth and 3 pay- ments of one- fifth of purchase price, 7 per cent.	Only for grass cutting.
Nashville, Chat- tanooga & St. Louis.	Tenn.....	3,500	Sale.....	One-fourth cash, annual pay- ments.	\$6 per mile along right of way.
New York Central Lines.	Mich.....	9,964	.....do.....	One-fourth cash, 3 payments, 6 per cent.	
St. Louis & San Francisco.	.....	9,905			
	Ark.....	120	Sale or lease.....		
	Mo.....	1,949			
	Tex.....	7,836			
Southern Pacific..	.....	480,000	Sale or lease.....	One-tenth cash; at end of second year beginning 9 equal annual in- stallments, 6 per cent (19-year amortization contracts, build- ing and cultiva- tion specifica- tions, 8.29 per cent).	On yearly terms; rates controlled by company.
Southern R. R. System.	.....	62,278	Sale.....	One-fourth cash, 3 years, 6 per cent.	
	Ala.....	3,733			
	Miss.....	58,545			
Mobile & Ohio....	.....	16,762		Covered by timber leases.	
Missouri-Pacific..	Ark.....	333,151	Sale.....	Cash for timber land; agricul- tural, one-fourth cash, 3 years, 6 per cent.	
Union Pacific.....	.....	921,432	Sale or lease.....	Cash or one-tenth down, 10 years, 6 per cent.	One year for cash.
	Nebr.....	11,445			
	Colo.....	27,141			
	Wyo.....	866,289			
	Utah.....	14,387			
	Kans.....	2,170			

SALE OF LAND BY COLONIZATION AND SETTLEMENT COMPANIES.

This country has always had large areas of undeveloped land and an expanding rural population. Consequently private companies for colonization and settlement have played an important part in promoting the distribution of undeveloped land.

Along lines of reclamation, such as clearing, draining, or irrigating, in road building, and under some circumstances preparing "made-to-order" farms, the land settlement, colonization, and development companies render a distinct service. Of course, clearing can be done by the individual operator in his spare time with a small cash outlay for explosives and tools. However, cooperative work or work by the development companies makes it possible to purchase explosives in wholesale lots and to use expensive labor-saving machinery beyond the reach of the man working alone.

Many of the companies carry on an active campaign in order to sell to small investors, generally to foreigners and other people not acquainted with conditions in the regions where the land lies. A certain section in Europe or an American industrial center is selected by the company as a source of prospective settlers. Classified advertisements of the company's holdings are run in daily papers, both in English and in the native language of the prospective buyers. Articles are carried by the papers in the centers of population in the homeland, and descriptive literature in English and in foreign languages is distributed in the industrial plants where the prospective buyers are employed.

Many of these settlers were tillers of the soil in the old country, but are not conversant with pioneer life. In nearly all cases they have just enough capital to make the first payment and purchase a meager equipment. Settlers without training and with little capital must have ample and liberal sources of credit in order to stick on the land until it can be made to yield a living and some money income. Many companies undertake to supply credit and to provide sources of direction, supervision, and advice until the settler has weathered the pioneer stage.

Theoretically, this plan should work out to the advantage of both settler and seller, and there are instances on record where it has done so. Frequently, however, the cost of selling and reclaiming, combined with the overhead costs of the company and the accrued carrying charges of the property, run the purchase price of the farm so high that it is beyond the producing value of the land. The liberal credit facilities may be counteracted by high rates of interest and periods of repayment too short for the turnover of the land. Often the settler is hampered in developing and equipping his farm through the necessity of holding off foreclosure,

and is thus saddled with a hopeless debt. It is the practice of some companies to withhold the deed to the land until one-half the purchase price has been paid, keeping the title with the company. Should the settler be unable to meet the unfavorable terms of his credit and be forced to abandon his farm, the company can offer the tract for sale again without hindrance.

Several railroads and other large landholders maintain demonstration farms. When such a farm is used to demonstrate on an economic basis the actual agricultural possibilities of the tract under consideration, it is a useful institution. When it is operated without regard to cost of production or overhead, when the prospective buyers are shown only selected samples of the most successful crops, and no mention is made of crop failures or other handicaps, then the plant becomes a show place deliberately planned to give false impressions and is not a demonstration of what the ordinary farmer with a moderate amount of capital and wholly dependent upon the farm may hope to accomplish.

A personal inspection of land before purchasing is almost an essential step in acquiring a farm, and facilities for showing land are usually included in the equipment of real-estate companies. Indeed, certain development companies provide, at a nominal cost, special Pullman trains for personally conducted excursions. During the journey free entertainment and sightseeing side trips are sometimes provided. The prospective purchasers are allowed to see only that which the company wants them to see and all derogatory evidences and unfavorable conditions are carefully concealed or ignored. The excursionists are not allowed access to the open market for land and have little or no opportunity of acquainting themselves with the local buying customs. In some localities where the conducted tours flourish, the land market is glutted by the newly opened holdings of the companies, and all "prospects" are carefully steered so as to keep them from purchasing from private holders. Prices for undeveloped land marketed in this way include the cost of the excursions, club houses, etc. Frequently this land does not compare favorably with improved farms already in the market that might be purchased for less money.

CONCLUSION.

From what has been said it will be seen that the undeveloped land now available for settlement in the United States can be brought under cultivation only at gradually increasing cost and effort, and in many cases with comparatively small returns from the land itself. The era of free first-class land in the United States

has passed, and with its passing has come an increase in the value of all land. The prospective purchaser in a developed region pays a higher money value for his farm than formerly. The prospective settler in an undeveloped region takes relatively poorer land, works longer to acquire ownership, and in many cases, must be content with a less productive farm than was the case with the earlier settlers. However, as population increases, the demand for improved land will inevitably call for the development of large portions of the land now lying idle. The settler first on the ground has the choice of the best land remaining.

APPENDIX.

1.—*State immigration bureaus, 1922.*

Alabama—Montgomery: Director of Immigration and Supervisor of Markets.
Arkansas—Little Rock: Commissioner of Immigration.
Arizona—Phoenix: Commissioner of Immigration.
California—Sacramento: Commissioner of Immigration and Housing.
Colorado—Denver: Commissioner of Immigration.
Florida—Tallahassee: Commissioner of Agriculture and Immigration.
Idaho—Boise: State Bureau of Immigration, Labor, and Statistics.
Louisiana—Baton Rouge: Commissioner of Agriculture and Immigration.
Maine—Augusta: Bureau of Industrial and Labor Statistics.
Maryland—Baltimore: Bureau of Immigration.
Michigan—Lansing: Commissioner of Immigration.
Minnesota—St. Paul: Commissioner of Immigration.
Missouri—Sedalia: Chief Commissioner of Immigration.
Montana—Helena: Commissioner of Agriculture and Publicity.
Nebraska—Lincoln: Bureau of Labor and Industrial Statistics.
Nevada—Carson City: Commissioner of Industry, Agriculture, and Irrigation.
New Jersey—Trenton: Department of Conservation and Development.
New Mexico—Albuquerque: Bureau of Immigration.
New York—Albany: Bureau of Farm Settlement.
Oregon—Salem: State Immigration Commission.
South Dakota—Pierre: Commissioner of Immigration.
Utah—Salt Lake City: State Bureau of Immigration.
Virginia—Richmond: Commissioner of Agriculture and Immigration.
Washington—Olympia: State Bureau of Immigration.
Wisconsin—Madison: Director of Immigration.
Wyoming—Cheyenne: State Immigration Commissioner.

2.—*State officers in charge of State lands, 1922.*

Alabama—Montgomery: State Land Commissioner.
Arizona—Phoenix: State Land Commissioner.
Arkansas—Little Rock: Commissioner of Immigration.
California—Sacramento: State Surveyor General.
Colorado—Denver: State Board of Agriculture.
Connecticut—Hartford: Board of Agriculture.
Idaho—Boise: State Board of Land Commissioners.
Indiana—Indianapolis: Office of the Auditor, Land Department.
Iowa—Des Moines: Commissioner of Land Office.
Kansas—Topeka: Register of State Lands.

Louisiana—Baton Rouge: Department of Agriculture and Immigration.
 Maine—Augusta: Department of State Lands and Forestry.
 Michigan—Lansing: Public Domain Commission.
 Minnesota—St. Paul: Auditor of State.
 Mississippi—Jackson: Mississippi Land Office.
 Missouri—Columbia: University of Missouri. Office of the Attorney.
 Montana—Helena: Department State Lands and Farm Loans.
 Nebraska—Lincoln: Commissioner of Public Lands and Buildings.
 Nevada—Carson City: State Land Register.
 New Hampshire—Concord: Commissioner of Public Lands.
 New Jersey—Trenton: Board of Conservation and Development.
 New Mexico—Santa Fe: Commissioner of Public Lands.
 New York—Albany: Commissioner of Land Office.
 North Carolina—Wilmington: State Board of Education.
 North Dakota—Bismarck: Office of Land Commissioner.
 Ohio—Columbus: Department of Public Works.
 Oklahoma—Oklahoma City: Commissioner of the Land Office.
 Oregon—Salem: Office of State Land Board.
 Rhode Island—Providence: State Land Commissioner.
 South Carolina—Columbia: State Land Commissioner.
 South Dakota—Pierre: Commissioner of School and Public Lands.
 Tennessee—Nashville: Commissioner of Land Office.
 Texas—Austin: State Land Commissioner.
 Utah—Salt Lake City: State Board of Land Commissioners.
 Virginia—Richmond: Register of Land Office.
 Washington—Olympia: Commissioner of Public Lands.
 West Virginia—Charleston: Commissioner of Public Lands.
 Wisconsin—Madison: Commissioner of Public Lands.
 Wyoming—Cheyenne: Commissioner of Public Lands.

3.—*States publishing lists of farms for sale or rent, 1922.*

Louisiana.—J. F. Denechaud, Secretary, Louisiana State Museum Building, New Orleans.
 Vermont.—E. S. Brigham, Commissioner of Agriculture, Montpelier.
 New Hampshire.—Andrew L. Felker, Commissioner of Agriculture, Concord.
 Massachusetts.—Arthur W. Gilbert, Commissioner of Agriculture, Boston.
 Rhode Island.—John J. Dunn, Secretary, State Board of Agriculture, Providence.
 New Jersey.—Alfred Gaskill, Department of Conservation and Development, Trenton.
 Maryland.—T. B. Symons, Maryland State College of Agriculture. College Park.
 Delaware.—State Department of Agriculture, Dover.
 Virginia.—G. W. Koerner, Commissioner of Agriculture, Richmond.
 New York.—Department of Farms and Markets, Albany.

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State.	Reservation.	Area for sale.	Area for entry.	State.	Reservation.	Area for sale.	Area for entry.
		<i>Acres.</i>	<i>Acres.</i>			<i>Acres.</i>	<i>Acres.</i>
California....	Hoopa.....	10,000	.....	Oklahoma....	Five Civilized Tribes..	2,755	.....
	Round Valley.....	(1)	.....		Klamath.....	13,000	.....
	Greenville.....	(2)	.....	Oregon.....	Siletz.....	2,800	.....
Colorado.....	Southern Ute.....	8,550	10,000		Umatilla.....	1,600	.....
Idaho.....	Coeur d'Alene.....	20,000	.....	Nebraska.....	Omaha.....	10,000	.....
	Nez Perce.....	30,000	.....	South Dakota	Cheyenne River..	32,500	.....
	Fort Hall.....	(1)	(1)		Crow Creek.....	10,000	.....
Kansas.....	Kickapoo.....	800	.....		Lower Brule.....	13,569	.....
Minnesota....	Red Lake.....	40,000	60,000		Pine Ridge.....	95,400	6,000
	Leech Lake.....	10,000	.....		Lisseton.....	16,000	.....
	White Earth.....	1,020	.....		Yankton.....	40,000	.....
Montana.....	Blackfeet.....	15,000	.....	Utah.....	Uintah.....	180,000	.....
	Crow.....	15,000	.....		(Former Res.)		.....
	Flathead.....	(1)	(1)		Uintah Ouray.....	1,030	.....
	Fort Peck.....	65,000	15,000		Spokane.....	13,360	.....
North Dakota	Fort Berthold.....	33,300	.....	Washington..	Tulalip.....	1,300	.....
	Standing Rock... (1)	(1)	(1)		Yakima.....	(1)	.....
	Turtle Mountain	22,000	.....	Wisconsin...	Lac Court Oreille	2,400	.....
Oklahoma.....	Cheyenne.....	.....	.....	Wyoming.....	Shoshone.....	(3)	()
	Arapahoe.....	100,000	.....	Oregon.....	Warm Springs...	(3)	()
	Seneca.....	6,000	.....	Oklahoma...	Cantonment.....	(3)	(3)
	Leger.....	6,000	.....	California..	Greenville.....	.....	.....
	Osage.....	1,000,000	.....		Total.....	2,608,717	.....
	Kiowa.....	.....	.....		
	Comanche.....	620,000	.....			
	Pawnee.....	170,333	.....			

¹ Land, but area indeterminate.